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May 6, 2014

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Paula Coleman)
110 Ninth Avenue South, Room 682
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Nashville, Tennessee 37203

Subject: ***Submittal of the Final Remedial Investigation Report***
Ash Pit No. 1 and Ash Pit No. 3
(Including Coal Yard No. 1 and Coal Yard No. 3)
FUDS Project No. G05OH001821
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912P5-12-D-0001: Shaw Project Number 146394

Dear Ms. Coleman:

In accordance with the requirements of Task Order No. DO-02 of Contract No. W912P5-12-D-0001 to CB&I Federal Services LLC, we are pleased to submit the internal draft Remedial Investigation Report for Ash Pit No. 1 and Ash Pit No. 3 (Including Coal Yard No. 1 and Coal Yard No. 3) at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report represents the full compilation and summary for the Remedial Investigation for Ash Pit No. 1 and Ash Pit No. 3, including the associated coal yards (DERP-FUDS Project No. G05OH001821). This report was prepared consistent with the following: the site characterization report (SCR), the baseline human health risk assessments (BHHRA), and the screening-level ecological risk assessments (SLERA) prepared for Ash Pit Nos. 1 and 3; the SCR, BHHRA, and SLERA addenda prepared for Coal Yard Nos. 1 and 3; the agreements among the PBOW project delivery team members; and communications with the U.S. Army Corps of Engineers regarding the scope of this report. This final report also incorporates responses to comments on the internal draft document.

Enclosed for your records are four copies of this report and a complete electronic copy is attached to each hard copy on compact disks. Copies have also been sent to those on the distribution list as indicated for their records.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven. T. Downey, PE, PMP
Project Manager

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Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No.1 and Ash Pit No. 3 Remedial Investigation Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912P5-12-D-0001

Delivery Order No. DO02

Project No. 146394

Task/Phase Number: 10000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
X	Report	Ash Pit Nos. 1 and 3 RI Report	**Document Status**
☐	Risk Assessment / Evaluation		☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
☐	Other:		☐ Other:

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Final
Remedial Investigation Report
Ash Pit No. 1 and Ash Pit No. 3
(Including Coal Yard No. 1 and Coal Yard No. 3)
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works,
Sandusky, Ohio

Prepared for:

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Project Number 146394

May 2014

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List of Acronyms

amsl	above mean sea level
AP1	Ash Pit No. 1
AP3	Ash Pit No. 3
bgs	below ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentration
CB&I	CB&I Federal Services LLC
COPC	chemical of potential concern
COPEC	chemicals of potential ecological concern
CY1	Coal Yard No. 1
CY3	Coal Yard No. 3
CSEM	conceptual site exposure model
DERP	Defense Environmental Restoration Program
D&M	Dames & Moore, Inc.
DNT	dinitrotoluene
DOD	U.S. Department of Defense
DQO	data quality objective
EHQ	ecological hazard quotient
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ESV	ecological screening value
FS	feasibility study
FUDS	Formerly Used Defense Sites
GOCO	government-owned, contractor-operated
HI	hazard index
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
IT	IT Corporation
LRD	Great Lakes and Rivers Division
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligram per liter
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

List of Acronyms (Continued)

NOAEL	no-observed-adverse-effects level
NWI	National Wetland Inventory
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
PAH	polycyclic aromatic hydrocarbon
PBOW	Plum Brook Ordnance Works
PCB	polychlorinated biphenyl
ppm	parts per million
PRG	preliminary remediation goal
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RBSC	risk-based screening concentration
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	remedial investigation
SCR	site characterization report
SDWR	Secondary Drinking Water Regulations
Shaw	Shaw Environmental & Infrastructure, Inc.
SI	site inspection
SLERA	screening-level ecological risk assessment
SVOC	semivolatile organic compound
TAL	target analyte list
TDS	total dissolved solids
TNT	trinitrotoluene
TNTA	TNT Area A
TNTC	TNT Area C
TOC	total organic carbon
TRV	toxicity reference values
USACE	U.S. Corps of Engineers
VOC	volatile organic compound
WAA	War Assets Administration
WWTP3	Waste Water Treatment Plant No. 3

Executive Summary

A remedial investigation (RI) was conducted for Ash Pit No. 1 (AP1) and Ash Pit No. 3 (AP3) at the former Plum Brook Ordnance Works, Sandusky, Ohio. AP1 and AP3 are administered as Defense Environmental Restoration Program-Formerly Used Defense Sites (DERP-FUDS) Project No. G05OH001821. This project includes AP1 and AP3, and the respective coal yards adjacent to these sites, Coal Yard No.1 (CY1) and Coal Yard No. 3 (CY3). The results of the RI have been previously reported in the following finalized documents:

Ash Pit No. 1

Shaw Environmental (Shaw), 2010a, ***Final, Ash Pit No. 1 and Ash Pit No. 3, Site Characterization Report, Former Plum Brook Ordnance Works, Sandusky, Ohio, Revision 1,*** November.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2011a, ***Final, Baseline Human Health Risk Assessment, Ash Pit No. 1 Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2011b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 1, Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

Coal Yard No. 1

Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013a, ***Final, Ash Pit No. 1 Baseline Human Health Risk Assessment Addendum For Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013b, ***Final, Ash Pit No. 1 Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Ash Pit No. 3

Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013d, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment, FUDS Project No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental Shaw Environmental & Infrastructure, Inc. (Shaw), 2012b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 3, Plum Brook Ordnance Works, Sandusky, Ohio,*** January.

Coal Yard No. 3

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013e, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment Addendum For Coal Yard No. 3, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013f, ***Final, Ash Pit No. 3, Screening Level Ecological Risk Assessment For Coal Yard No. 3, FUDS Project No. G05OH001821, Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

This RI summarizes the findings of these 11 reports, which are appended. No additional investigation results, evaluation, or information concerning these sites is provided in this RI report that was not previously provided in the 11 reports listed above. Recommendations are also provided based on this previously provided information. Thus, the purposes of this RI report are to 1) place all RI-related reports under a single cover, and 2) record a recommendation as to whether or not performance of a feasibility study is warranted.

The overall findings from the studies conducted for the four areas indicate that exposure to environmental media associated with these sites poses no unacceptable human health risks/hazards or ecological hazards that are attributable to past Department of Defense practices.

Recommendations. Based on the RI results, the U.S. Army Corps of Engineers recommends no further action with respect to the AP1, CY1, AP3 and CY3 sites. Therefore, a feasibility study is not warranted for DERP-FUDS Project No. G05OH001821.

1.0 Introduction

The U.S. Army is conducting studies of environmental impacts attributable to releases associated with historical operations at the former Plum Brook Ordnance Works (PBOW) in Sandusky, Erie County, Ohio. This property was previously a government-owned, contractor-operated (GOCO) facility used to manufacture nitroaromatic explosives and pentolite for the U.S. Department of Defense (DoD). PBOW is an Army Defense Environmental Restoration Program (DERP) project under the Great Lakes and Rivers Division (LRD) Formerly Used Defense Sites (FUDS) program. The Louisville District Office of the U.S. Corps of Engineers (USACE) is the program management district for the LRD FUDS program. Management support for PBOW is provided by the USACE Huntington District Office, and technical oversight is provided by the USACE Nashville District Office.

A remedial investigation (RI) was conducted for Ash Pit No. 1 (AP1) and Ash Pit No. 3 (AP3) at PBOW. AP1 and AP3 are administered as Defense Environmental Restoration Program (DERP) FUDS Project No. G05OH001821. This project includes AP1, AP3, and respective coal yards adjacent to these sites, Coal Yard No.1 (CY1) and Coal Yard No. 3 (CY3). These four site areas are collectively referred to herein as the "AP1 and AP3 sites."

RI activities were conducted under Delivery Order Nos. DX05 (for AP1 and AP3) and DX02 (for CY1 and CY3), which are both part of Contract No. W912QR-08-D-0013 and previously held by Shaw Environmental & Infrastructure, Inc. Please note that the Shaw Group was acquired by CB&I in 2013. As a result, this contract and other contracts have been novated to CB&I Federal Services LLC (CB&I). This report, submitted under Task Order DO-02 of Contract No. W912P5-12-D-0001, summarizes the information presented previously in the following reports:

Ash Pit No. 1

Shaw Environmental (Shaw), 2010a, ***Final, Ash Pit No. 1 and Ash Pit No. 3, Site Characterization Report, Former Plum Brook Ordnance Works, Sandusky, Ohio, Revision 1,*** November.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2011a, ***Final, Baseline Human Health Risk Assessment, Ash Pit No. 1, Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2011b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 1, Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

Coal Yard No. 1

Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013a, ***Final, Ash Pit No. 1 Baseline Human Health Risk Assessment Addendum For Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013b, ***Final, Ash Pit No. 1 Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Ash Pit No. 3

Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013d, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment, FUDS Project No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental Shaw Environmental & Infrastructure, Inc. (Shaw), 2012b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 3, Plum Brook Ordnance Works, Sandusky, Ohio,*** January.

Coal Yard No. 3

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013e, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment Addendum For Coal Yard No. 3, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Shaw Environmental & Infrastructure, Inc. (Shaw), 2013f, ***Final, Ash Pit No. 3, Screening Level Ecological Risk Assessment For Coal Yard No. 3, FUDS Project No. G05OH001821, Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

It should be noted that this RI report generally presents and summarizes information directly as it was conveyed in these final approved reports. No new data are presented in this RI report. However, Section 2.4 includes an updated evaluation of groundwater quality in the vicinity of PBOW based on other PBOW documents (e.g., Shaw, 2008a; 2012c).

1.1 Report Organization

As part of the RI effort, environmental media (i.e. soil, groundwater, surface water, and sediment) from the four AP1 and AP3 sites were previously investigated and evaluated in site characterization reports (SCR), baseline human health risk assessments (BHHRA), and screening-level ecological risk assessments (SLERA). This RI report summarizes these reports and presents recommendations based on their findings. The SCRs, BHHRAs, and SLERAs are appended to this report in their entirety (Appendices A through K) in electronic format on compact disk.

The remainder of this chapter provides a description and history of the PBOW facility as well as the history and current conditions of the ash disposal pits and coal storage areas associated with Powerhouse No. 1 and Powerhouse No. 3. More specific information on the four AP1 and AP3 sites is included in the respective SCRs, BHHRAs, and SLERAs that are appended to this RI report. Chapter 2.0 of this report summarizes the physical setting of PBOW and specifically addresses the two sites currently being evaluated. This discussion of physical setting includes the physiography, topography, geology, hydrogeology and natural groundwater quality.

Chapter 3.0 summarizes the SCR, BHHRA, and SLERA for AP1, and summaries of the CY1 SCR, BHHRA, and SLERA are presented in Chapter 4.0. Chapter 5.0 presents summaries of the SCR, BHHRA, and SLERA for AP3. Chapter 6.0 summarizes the SCR, BHHRA, and SLERA for CY3. Chapter 7.0 presents site-specific recommendations for site management decisions. These recommendations primarily discuss whether or not a remedial action is warranted. These recommendations do not identify a specific technological approach but are provided to help site managers form a basis for determining whether a feasibility study (FS) is required or if proceeding to a no-action proposed plan is the appropriate course for a given site. References used in the RI are provided in Chapter 8.0.

1.2 Facility Location and Description

The former 9,000-acre PBOW facility was used for the manufacture of nitroaromatics during World War II. The National Aeronautics and Space Administration (NASA) operates and maintains the site as the Plum Brook Station, which is a satellite of the John H. Glenn Research Center, located at Lewis Field in Cleveland, Ohio. PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. Although primarily in Perkins and Oxford Townships, the

eastern edge of PBOW extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S Highway 250. The areas surrounding PBOW are primarily agricultural and residential. Public access is prohibited at PBOW except during the annual deer hunting season, which is by permit only. Figure 1-1 shows the geographical location of the former PBOW facility.

1.3 Facility History and Background

The former PBOW was established by the War Department as a GOCO facility for the production of 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene (DNT), and pentolite during World War II. The PBOW site originally consisted of approximately 9,100 acres, approximately 3,500 acres of which was used as a buffer area outside the facility fence line. The property was acquired in the name of the United States of America in 1941. The government contractor, Trojan Powder Company, operated the production facility from December 1941 until 1945. It is estimated that during this period more than 1 billion pounds of nitroaromatic explosives were manufactured.

At the end of production in September 1945, PBOW was placed in standby operation status and the Army conducted decontamination and decommissioning activities. On December 17, 1945, the U.S. Army Ordnance Department (Ordnance Department) obtained physical control of the site. The Ordnance Department continued decontamination efforts until August 1946. In 1946, over 6,200 acres, 3,231 located within the fenced area, were transferred to the War Assets Administration (WAA) and approximately 2,800 acres were transferred to the Ravenna Arsenal. This 2,800-acre parcel, transferred to Ravenna Arsenal and referred to as the Magazine Area, was transferred again in July 1947 to the Erie Ordnance Depot, LeCarne, Ohio (War Department, 1947). The Magazine Area included approximately 2,300 acres inside the PBOW fence and 500 acres of the buffer area, outside of the fence.

In 1949, the General Services Administration took control of WAA's portion of the PBOW property, which included an indeterminate amount of acreage outside of the fenced boundary due to conveyances by WAA to private landowners during the late 1940s and early 1950s. It is believed that farmers were given the opportunity to buy back land in the buffer area, outside of the fenced site.

In August 1954, PBOW was made a satellite to Ravenna Arsenal (U.S. Army Materiel Command, 2001). From August 1954 to sometime in 1958, further decontamination was performed by the Army. The decontamination included removal and disposal of contaminated surface and subsurface soil around the buildings and wooden and ceramic waste disposal lines

containing TNT. This included thousands of pounds of TNT discovered in catch basins, removed, and incinerated at the burning grounds.

Two property use agreements were entered into by the Army and the National Advisory Committee for Aeronautics (NACA), the predecessor of NASA, in March 1956 and January 1958, respectively. The first agreement was for approximately 500 acres on which NACA built a nuclear reactor. The second agreement gave NACA (NASA as of October 1958) use of an additional 2,700 acres within the fenced area but outside the Magazine Area, for a total of 3,231 acres under the two use agreements. At this time, NASA had use of all property inside the PBOW fence except the 2,300 acres in the Magazine Area. The Army declared this 3,231-acre property as excess in October 1958.

The Army declared the Magazine Area as excess in September 1961, and NASA formally requested custody of the property in October 1961 (NASA, 1961). On March 15, 1963, accountability and custody of the PBOW property (6,031 acres) were transferred from the Department of the Army to NASA.

Prior to NASA's acceptance of the property in March 1963, Ravenna Arsenal performed additional decontamination and subsequently certified 500 acres of the former PBOW property was decontaminated and suitable for unrestricted future use. This decontamination certification was only for the 500 acres in the former pentolite manufacturing area (the area where NASA built the nuclear reactor) under the first use agreement. NASA identified additional DoD-related contamination in 1963, after transfer of the property. NASA performed further decontamination efforts and the removal of structures in1964.

NASA has operated and maintained the former PBOW property inside the fence line since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of its John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site have been demolished or are currently on standby or inactive status. During 1967 through 1971, NASA purchased approximately 2,000 acres outside of the PBOW boundary fence from local farmers as "buffer." On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. This excess included approximately 1,500 acres of farmland outside the fence, including those purchased from farmers beginning in 1967, and was sold as farmland (NASA, 2013). Also, 46 acres outside of the fence in the northeast corner of the PBOW facility near the guard house (near the northwest corner of the former PBOW facility) was conveyed to the Perkins Township Board of Education and is used as a bus transportation area. In addition, the 2,152 acres of PBOW declared excess included a 604-acre parcel in the western part of the

fenced property known as “Parcel 59.” This area remains under NASA control. NASA presently controls approximately 6,432 acres (NASA, 2013), including approximately 5,500 acres within the former PBOW fence and 900 acres outside of the fence which have been leased for agriculture (NASA, 2012).

The former PBOW DERP/FUDS property includes the entire 9,100 acres, but the only known project areas are within the fenced area controlled by NASA. The area outside the fence was a buffer zone during the PBOW manufacturing period, and there are no known or suspected projects outside the fence line. The AP1 and AP3 sites are within the former PBOW and current NASA fence.

1.4 Site-Specific Description and History

During PBOW operation, three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal yard, and two aboveground fuel storage tanks (USACE, 2000a). The powerhouses generated steam which was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas for coal used in the powerhouses’ boilers. The coal was brought into the coal yards via train (Shaw, 2012a). Coal ash created from the burnt coal in each of the powerhouse boilers was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment (i.e., ash pit) (USACE, 2000a).

AP1. AP1 is located in the central part of PBOW, approximately 1,095 feet west of the intersection of Maintenance Road and Taylor Road and approximately 50 feet south of Maintenance Road (Figure 1-2). The approximate size of AP1 is 400 feet by 210 feet, comprising nearly 2 acres. During PBOW operation, AP1 received coal ash slurry generated from the boiler in nearby Powerhouse No. 1. Most of this powerhouse building has been demolished, but a portion was remodeled and is currently being used by NASA as a storage/shop building and power supply hub station (Shaw, 2010a).

CY1. CY1 is located immediately to the west of Powerhouse No. 1 (Figure 1-2). The historical former coal yard is estimated to have been approximately 350 feet wide by 210 feet in length (approximately 1.7 acres). The former coal yard is currently covered with grass and brush vegetation (Shaw, 2012a).

AP3. AP3 is located approximately 800 feet southwest of the intersection of Maintenance Road and Ransom Road and west of the former NASA K-Site Test Facility research building (formerly Powerhouse No. 3) (Figure 1-2). The size of AP3 is approximately 200 feet by 200 feet, comprising nearly 1 acre (Shaw, 2010a). During PBOW operation, AP3 received coal ash slurry generated from the boiler in the nearby power station, Powerhouse No. 3 (USACE, 2000a).

CY3. CY3 is located immediately to the south of Powerhouse No. 3 (Figure 1-2). The historical former coal yard is estimated to have had been approximately 200 feet wide by 210 feet in length, covering approximately 1 acre. During a site visit in 2012, only minor amounts of residual coal still found to be present in the shallow subsurface. The removal date of the stockpiled coal is unknown. Most of the area is currently covered with grass; however, approximately one-half of the western side of the former coal yard is covered with gravel.

2.0 Physical Setting

2.1 Physiography and Topography

PBOW is located within the Eastern Lake Region of the Central Lowland Province (Soil Conservation Service, 2006). The facility is on a plain with a slight slope to the north-northeast toward Lake Erie at approximately 25 feet per mile. Elevations across the PBOW facility range from 680 feet above mean sea level (amsl) at the intersection of Taylor Road and Patrol Road on the southwestern side of the site to 625 feet amsl at the northern portion of the installation. In general, the topography of PBOW is characterized by a flat ground surface with occasional low hummocks caused primarily by glacial scouring and deposition. A low escarpment trends from the western to the northeastern portion of the site (Shaw, 2005).

AP1. In 1999, AP1 was noted to be overgrown with thick vegetation and a thicket of small trees ranging from 3 to 8 feet tall. Due to the basically level terrain, AP1 is believed to have been backfilled and graded since the 1945 era. Personnel were informed by NASA that an underground, high-voltage utility line bisected AP1 in a north-south direction and an underground telephone line was present approximately 5 feet south and parallel to Maintenance Road. The USACE also noted a culvert under Maintenance Road and an associated drainage ditch approximately 5 feet due north of AP1. A larger drainage ditch located northwest of AP1 contained water and was flowing in a northeast direction (Shaw, 2009a).

CY1. During the field investigation, the majority of the CY1 area was observed to be overgrown with sparsely spaced brush, with the southern perimeter covered with young trees and brush. The majority of CY1 area is fairly level, with the outer 20 feet of the southern, western, and northern portions gently dipping in a radial pattern. Surface water runoff percolates into and through the thin residual layer of coal at the coal yard. Surface water runoff on the southern and western portions drains into the unnamed tributary located to the west, while surface water on the northern section drains into AP1 (Shaw, 2012a).

AP3. AP3 is partially surrounded by thick vegetation with mature and smaller trees. The discharge pipeline from Powerhouse No. 3 to the former ash pit is no longer present. Water that accumulates in AP3 is drained from the pit by means of an east-west-trending ditch that eventually discharges into Pipe Creek. Boundaries of the pit appear to be the same as the original boundaries, with the exception of an indention to the west on the eastern boundary (USACE, 2000a).

CY3. The western half of CY3 is covered with crushed stone and was used for parking and NASA testing operations. The eastern half is a grassy area. During a site visit performed on September 1, 2011, CY3 was observed to be mostly covered by grassy vegetation that appeared to be infrequently mowed. The ground surface is fairly level, with gentle downward grades to the west and east. Surface water runoff, therefore, drains gently from CY3 both to the west into AP3 and to the east into a drainage ditch that runs parallel to Ransom Road (Shaw, 2013c).

2.2 Geology

The bedrock in northern Ohio and found at PBOW consists of Devonian and Silurian carbonates (limestone and dolomite) and clastics (shale, siltstone, and sandstone). At PBOW, two bedrock units have been encountered during well installation at AP1 and AP3: the Delaware Limestone and the Olentangy Shale. Further details of PBOW-specific geology are presented in the AP1 and AP3 SCR (Appendix A). Site-specific geology is summarized in Section 3.2.2.2 (AP1) and 5.2.2.2 (AP3). Bedrock monitoring wells were not installed for either coal yard, but the geologic interpretations for AP1 and AP3 are regarded as representative for CY1 and CY3, respectively.

2.3 Hydrogeology

Two groundwater aquifer systems are present in the region: a carbonate (limestone) aquifer to the west and a shale aquifer to the east (Shaw, 2005). PBOW is located within the transition of the two systems. Both aquifers are overlain by a veneer of glacial drift, generally less than 20 feet thick, generically referred to as the overburden. Groundwater in the overburden is in discontinuous pockets during dry time periods and is considered a poor source of groundwater (Shaw, 2005; IT Corporation [IT], 1997a, 1999, 2001a). Groundwater in the overburden and groundwater in the shale unit exhibit similar water levels, suggesting substantial vertical communication, and are the overburden and groundwater considered one hydrogeologic unit (i.e., the overburden/shale). During periods of low precipitation, only limited vertical migration of contaminants would occur in the overburden/shale because of reduced infiltration. Flow in the overburden/shale is toward the local surface drainages, with a generally northerly trend. Because of the discontinuous nature of the overburden/shale, lateral migration is minimal. In general, the overburden/shale has a low permeability, yielding an insufficient volume of groundwater for potable use in many areas underlying PBOW.

Groundwater flow in the Delaware Limestone is generally toward the north but is influenced by major fracture zones (Shaw, 2005). The limestone bedrock water-bearing zone yields groundwater year-round, although specific groundwater yield from any bedrock monitoring well is dependent upon the bedrock fracture(s) encountered. The limestone unit typically yields an adequate volume of groundwater for a drinking water source but is regionally regarded by the

Ohio Department of Natural Resources (ODNR) as being of low quality because of high mineral content (ODNR, 1962). Limestone bedrock groundwater underlying most of PBOW is of poor natural quality largely due to naturally occurring petroleum hydrocarbons and hydrogen sulfide gas emissions. Emissions of hydrogen sulfide gas from wells may result in nuisance odors and, at elevated levels, potential health concerns. The presence of hydrogen sulfide gas, which has direct and indirect corrosive effects, results in the rapid deterioration of metal components of well materials, pumps, and plumbing.

Site-specific hydrogeology of groundwater underlying AP1 and AP3 is summarized in Sections 3.2.2.3 and 5.2.2.3, respectively.

2.4 Groundwater Quality and Use

2.4.1 Groundwater Quality

Three overburden/shale (AP1-MW01, AP1-MW02, and AP1-MW03) and two bedrock (AP1-BEDGW-001 and AP1-BEDGW-002) monitoring wells were installed at AP1 to measure the groundwater quality. Similarly, three overburden/shale (AP3-MW01, AP3-MW02, and AP3-MW03) monitoring wells were installed at AP3 to measure the groundwater quality. No overburden/shale or bedrock groundwater monitoring wells were installed at CY1 or CY3. Overburden/shale and limestone bedrock groundwater quality at AP1 and AP3 was evaluated in context of the regional characteristics of these aquifers and observations made with respect to findings concerning groundwater quality at other PBOW sites.

Overburden/Shale Groundwater. Groundwater in the overburden is in discontinuous pockets during dry time periods (Shaw, 2005; IT, 1997a, 1999, 2001a). Also, the overburden/shale generally has a low permeability, yielding an insufficient volume of groundwater for potable use in many areas of the underlying PBOW. Additionally, groundwater from background wells in competent shale bedrock was found to have elevated concentrations of chloride, sulfate, iron, manganese, and total dissolved solids (TDS) (Shaw, 2006). Some of these concentrations, especially those of sulfate and TDS, were found at levels that far exceed the respective U.S. Environmental Protection Agency (EPA) Office of Groundwater Secondary Drinking Water Regulations (SDWR) or health advisories (EPA, 2012). The SDWRs are nonenforceable levels that are based on aesthetic properties (e.g., taste, odor, and color) or cosmetic effects (e.g., skin or tooth discoloration). The following list compares concentrations of these analytes in samples from off-site upgradient background shale unit groundwater wells to the respective Office of Drinking Water SDWRs or health advisories.

- ***Chloride*** – Fifty percent of the background wells exceeded the chloride SDWR of 250 milligrams per liter (mg/L) or parts per million (ppm). The maximum background concentration (3,540 ppm) was 14 times higher than the SDWR.

- ***Sulfate*** – Eleven percent of the background wells exceeded the sulfate SDWR of 250 ppm. The maximum background concentration (514 ppm) was approximately twice the SDWR.

- ***Iron*** – Thirty-two percent of the background wells exceeded the iron SDWR of 0.3 ppm. The maximum background concentration (1.55 ppm) was approximately 5 times higher than the SDWR.

- ***Manganese*** – Sixty-one percent of the background wells exceeded the manganese SDWR of 0.05 ppm. The maximum background concentration (0.728 ppm) was over 14 times higher than the SDWR.

- ***Sodium*** – One hundred percent of the background wells exceeded the sodium health advisory level of 20 ppm. The maximum background concentration (1,390 ppm) was approximately 70 times higher than the sodium health advisory level. (Note that no SDWR exists for sodium.)

- ***TDS*** – Eighty-two percent of the background wells exceeded the TDS SDWR of 500 ppm. The maximum background concentration (6,850 ppm) was nearly 14 times higher than the SDWR.

Based on naturally occurring high TDS and other analytes as described above, this groundwater unit is consistent with the EPA guidelines for Class III nonpotable groundwater. Therefore, overburden/shale groundwater is not a suitable drinking water source based on both low yield and naturally poor quality.

The low yield in the overburden/shale groundwater that is characteristic under much of PBOW was observed in the vicinity of AP1. At the AP1 site, only four of the six installed piezometers exhibited sufficient groundwater for sample collection, and from the four that were sampled, only two provided adequate yield to be collected using the low-flow sampling methodology. In addition, only one of the three overburden/shale monitoring well samples could be collected using the low-flow sampling methodology during both the months of May (wet season) and November (dry season) due to sufficient water volume.

At AP3, no temporary piezometers were installed, and overburden/shale groundwater sample collection methods varied due to nearby nesting eagles. Each of the three overburden/shale monitoring wells was purged dry during well development, indicating poor yield. In addition, low-flow groundwater sampling was completed at the site, although very low purge rates were

used due to the low groundwater yield. Temporary piezometers were installed at Waste Water Treatment Plant No. 3 (WWTP3), which borders AP3 to the north. Only three of the six piezometers installed at WWTP3 yielded sufficient groundwater for sampling. In addition, low-flow sampling could not be completed at any of the three WWTP3 overburden/shale monitoring wells. Based on these observations, use of overburden groundwater is regarded as implausible in the vicinity of AP3.

Limestone Bedrock Groundwater. The limestone bedrock water-bearing zone yields groundwater year-round, although specific groundwater yield from any bedrock monitoring well is dependent upon the bedrock fracture(s) encountered. During periods of low precipitation, only limited migration of contaminants would occur in the overburden/shale due to reduced infiltration. Although groundwater samples were collected from all limestone bedrock wells, the recharge rate was low, requiring the wells to be sampled 24 hours after purging. Based on this observation, the limestone bedrock groundwater unit underlying AP1 does not provide sufficient yield to be considered a source of potable water. No limestone bedrock monitoring wells were installed at AP3, but the limestone bedrock wells were installed at adjacent WWPT3. Although groundwater samples were collected from all WWTP3 limestone bedrock wells, the recharge rate was low, requiring the wells to be sampled 24 hours after purging. Based on groundwater sampling activities at WWTP3, groundwater yield from the limestone bedrock aquifer in the vicinity of AP3 (i.e., at WWTP3) is insufficient for potable use.

As previously noted, the limestone bedrock underlying most of PBOW is of poor natural quality, largely due to naturally occurring petroleum hydrocarbons and hydrogen sulfide gas emissions. Hydrogen sulfide was not noted on either of the boring logs of the two AP1 bedrock monitoring wells. Existing monitoring well MNTA-BEDGW-001, used as the downgradient well for AP1, has exhibited hydrogen sulfide measurements during borehole drilling and groundwater sampling events with readings greater than 50 ppm.

Natural petroleum-derived hydrocarbon seeps are common along the walls of area quarries (Shaw, 2005). Petroleum hydrocarbons were observed at depth during the drilling of AP1 bedrock well AP1-BEDGW-001. Well AP1-BEDGW-001 had petroleum hydrocarbon seeping from fractures between the depths of 57.5 to 60.4 feet and 62.0 to 64.3 feet, and from a fossil coral at a depth of 65.6 feet bgs. Also, a hydrogen sulfide odor was measured at 76 ppm during the development of bedrock well AP1-BEDGW-002.

No bedrock monitoring wells were installed at AP3. However, at the project site north of AP3, WWTP3, petroleum hydrocarbon was encountered at depth in the rock cores of all three bedrock

monitoring wells: WTP3-BEDGW-001 (40.4 to 42.9, 47.6, 51.0, and 53.1 feet below ground surface [bgs]), WTP3-BEDGW-002 (40.5 to 43.4 and 47.8 feet bgs), and WTP3-BEDGW-003 (40.2 to 44.2, 47.3, and 52.9 feet bgs). Well WTP3-BEDGW-002 also exhibited high levels of hydrogen sulfide (more than 200 ppm) (Shaw, 2011c). With petroleum hydrocarbon presence and excessive hydrogen sulfide measurements from both AP1 and WWTP3, indications suggest that bedrock groundwater in the vicinity of AP1 and AP3 is of natural poor quality.

Consistent with the findings of naturally occurring petroleum hydrocarbons in the limestone wells, benzene was detected in the groundwater at concentrations above both the risk-based screening concentration (RBSC) and background screening concentration (BSC) in all three of the AP1 bedrock wells sampled (AP1-BEDGW-001, AP1-BEDGW-002, and MNTA-BEDGW-001). Benzene concentrations in the groundwater samples ranged from 3.7 to 1,300 micrograms per liter [µg/L], with four of the five analytical results exceeding the promulgated Safe Drinking Water Act maximum contaminant level for benzene of 5 µg/L (EPA, 2012).

The TDS concentration of each AP1 limestone bedrock groundwater sample (3,130 to 9,580 mg/L) exceeded the SDWR for TDS of 500 mg/L. SDWRs are nonenforceable federal guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water that are used by public water authorities as guidance for acceptability of water as a potable source. The most common components of TDS are common salts; very small particulates; and ionic forms of common elements such as calcium, magnesium, sodium, iron, sulfate, and strontium (Ohio Environmental Protection Agency [OEPA], 2009). The elevated TDS within the limestone bedrock that underlies PBOW likely results from the reducing conditions that mobilize metals. In addition, naturally occurring long-chained petroleum hydrocarbon molecules may also contribute to TDS in PBOW bedrock groundwater.

In summary, the limestone unit underlying PBOW generally provides an adequate quantity of groundwater for hypothetical potable use. However, the yields in the vicinities of the AP1 and AP3 sites appear to be insufficient to support potable use. Regardless of yield, the natural quality of limestone bedrock groundwater underlying PBOW would fail drinking water standards with respect to naturally occurring benzene that consistently exceeds the maximum contaminant level and the elevated TDS. The elevated benzene is related to naturally occurring petroleum hydrocarbons, and the high TDS is likely associated with naturally occurring reducing conditions.

2.4.2 Groundwater Use

Approximately 170 private drinking water wells permitted by the Erie County Health Department are located within 4 miles of PBOW. USACE conducted a private well survey for the area within 1 mile of the downgradient PBOW boundary. Only five private wells were identified within the 1-mile radius. Two of these were identified as being used for the irrigation of lawns and gardens and washing cars, and the other three were not used at all (Appendix A of Shaw [2006]). Groundwater is not used within the PBOW facility.

2.5 Surface Water

PBOW lies in the eastern region of the Pickeral Creek–Pipe Creek Basin, which in turn, lies within the St. Lawrence River drainage basin. The Huron River Basin lies approximately 3.5 miles east of PBOW. Sandusky Bay and Lake Erie are approximately 4.5 miles north of the facility.

Eleven streams pass through or originate within PBOW and are a part of four drainage areas: 1) Sawmill Creek (southern PBOW); 2) Plum Brook (central PBOW); 3) Pipe Creek (western PBOW); and 4) Storrs-Hemminger Ditch. All streams flow north or northeasterly into Sandusky Bay. Numerous ponds lie within and around PBOW. Pipe Creek flows in a northerly direction on the western perimeter of AP3.

The Erie County Health Department does not permit the use of surface water for private drinking water, and no surface water within PBOW is used as a drinking water supply.

3.0 Ash Pit No. 1

This chapter provides a summary of the sampling, analyses, results, and evaluation of the environmental media associated with AP1 (i.e., soil, overburden/shale groundwater, limestone bedrock groundwater, surface water, and sediment) that have been presented in the AP1 SCR (Appendix A), BHHRA (Appendix B), and SLERA (Appendix C). The reference for each of these documents is provided below:

- Shaw Environmental (Shaw), 2010a, ***Final, Ash Pit No. 1 and Ash Pit No. 3, Site Characterization Report, Former Plum Brook Ordnance Works, Sandusky, Ohio, Revision 1,*** November.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2011a, ***Final, Baseline Human Health Risk Assessment, Ash Pit No. 1 Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2011b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 1, Plum Brook Ordnance Works, Sandusky, Ohio,*** August.

In addition, results of the previous initial site inspection (SI) of AP1 (USACE, 2000b) are briefly summarized in Section 3.1. Identification of the samples and the recommendations from the SI present a context for the performance of the RI and for some of the specific sampling locations and analyses performed in the RI.

Please note that this chapter provides no data or other information that has not been previously presented in the AP1 SCR, BHHRA, or SLERA (Appendices A, B, and C).

3.1 Previous Investigation and Evaluation

Prior to the RI, the following analytical samples were collected in 1999 as part of the SI for AP1 (USACE, 2000b):

- Six (0 to 1 foot) surface soil samples
- One (1 to 4 feet) composite subsurface soil sample
- One surface water sample
- One sediment sample.

Soil samples were analyzed for semivolatile organic compounds (SVOC) and target analyte list (TAL) metals. One surface and one subsurface soil sample were also analyzed for SVOCs, TAL metals, total organic carbon (TOC), and geotechnical parameters (Sieve/Atterberg tests). The

surface water and sediment samples were analyzed for SVOCs and Resource Conservation and Recovery Act (RCRA) metals.

In the SI, no SVOCs were detected in any of the soil, surface water, or sediment samples and no RCRA metals were detected in the surface water sample. Analytical results were compared to preliminary remediation goals (PRG) derived by EPA (2004a) as a qualitative screening evaluation. Based on this SI screening evaluation, the TAL metals arsenic and iron were detected above their respective PRGs. Arsenic was above PRG values in all surface soil samples and iron was above PRG levels in five of the six samples. Arsenic and iron were also detected above their respective PRGs in the single subsurface soil sample as well as in the sediment sample. Based upon these exceedances, it concluded that past DoD activities may have negatively impacted the environment and further investigation was recommended (USACE, 2000b). This RI report addresses the concerns raised in the SI evaluation. The SI results are summarized in the SCR (Appendix A) and were further evaluated in the BHHRA (Appendix B) and SLERA (Appendix C), together with the RI analytical results.

3.2 Site Characterization and Evaluation

This section summarizes the RI sampling of environmental media at AP1, the analytical results, and an evaluation of these results. Additional details are provided in the SCR (Appendix A).

3.2.1 Samples and Analyses

The RI samples were collected consistent with the site-specific quality assurance project plan (QAPP) (Shaw, 2008b) and work plan for AP1 (Shaw, 2009a). Soil, groundwater, surface water, and sediment sampling locations are shown on Figure 3-1.

Surface and subsurface soil samples were collected as part of the RI from six borings. Generally, surface soil is defined as samples collected from within the interval of 0 to 1 foot bgs, and subsurface soil is defined as samples collected from depths greater than 1 foot bgs per the RI work plan (Shaw, 2009a). It was also determined during the direct-push soil sampling that fill material was present in the ash pit with variable thicknesses. The work plan called for surface soil sample collection at a depth of 0 to 1 foot within the native soil followed by the 3-to 5-foot subsurface soil sample. The 8- to 10-foot soil sample was collected from a depth of 8 to 10 feet below the existing ground surface.

Six temporary piezometers were installed as described in the work plan. However, only four of these (AP1-PZ01, AP1-PZ02, AP1-PZ04, and AP1-PZ05) yielded adequate groundwater volume for sampling.

Three overburden/shale groundwater monitoring wells (AP1-MW01, AP1-MW02, and AP1-MW03) and two limestone bedrock monitoring wells (AP1-BEDGW-001 and AP1-BEDGW-002) were installed at AP1 as directed by the work plan. The work plan was designed to include upgradient, source area, and downgradient groundwater locations for both the overburden/shale wells and limestone bedrock monitoring wells. The placement of overburden/shale monitoring wells was based on groundwater flow directions determined from newly installed piezometers. Sitewide limestone bedrock groundwater flow maps were used to place new bedrock monitoring wells. Only two limestone bedrock monitoring wells were necessary at AP1 because existing monitoring well MNTA-BEDGW-001 could be used as the downgradient monitoring well.

The collection of three collocated surface water and sediment samples was also conducted from locations within the unnamed drainage ditch located west of AP1. In addition, one collocated surface water and sediment sample set was also collected from a low-lying, wet area in the northern portion of AP1.

The following list summarizes the samples and analyses collected for the RI:

- ***Surface Soil*** – Ten samples, including one quality control (QC) field duplicate sample and one quality assurance (QA) field split sample, were analyzed for nitroaromatics, SVOCs, TAL metals, and polychlorinated biphenyls (PCB), and one sample was analyzed for TOC.

- ***Subsurface Soil*** – Twelve samples, including one QC field duplicate sample and one QA field split sample, from within an overall depth interval of 3 to 5 feet were analyzed for nitroaromatics, TAL metals, PCBs, and SVOCs. Twelve samples, including one QC field duplicate sample and one QA field split sample, from within a depth interval of 8 to 10 feet were analyzed for nitroaromatics, TAL metals, and SVOCs.

- ***Overburden/Shale Piezometers*** – Five groundwater samples, including one QC field duplicate sample and one QA field split sample, were analyzed for nitroaromatics, TAL metals (filtered and unfiltered), SVOCs, hardness, cyanide, and general chemistry parameters; field tests were also conducted. In addition, due to limited groundwater volume, one piezometer (AP1-PZ04) was analyzed only for nitroaromatics and SVOCs.

- ***Overburden/Shale Monitoring Wells*** – A total of six groundwater samples, three in the wet season and three in the dry season, were analyzed for nitroaromatics, TAL metals (filtered and unfiltered), SVOCs, volatile organic compounds (VOC), and general chemistry parameters; field tests were also conducted. Due to lack of water

volume in well AP1-MW03 during the month of November, cyanide was not analyzed.

- ***Limestone Bedrock Monitoring Wells*** – A total of six groundwater samples, three in the wet season and three in the dry season were analyzed for nitroaromatics, TAL metals (filtered and unfiltered), SVOCs, VOCs, and general chemistry parameters; field tests were also conducted.

- ***Surface Water*** – Four samples were collected from the unnamed tributary located west of AP1 and one sample was collected from a low-lying, wet area within the northern portion of the site. Samples were analyzed for nitroaromatics, TAL metals, SVOCs, PCBs, and water quality parameters.

- ***Sediment*** – Four sediment samples were collected from the unnamed tributary located west of AP1 and one sample was collected from a low-lying, wet area within the northern portion of the site. These were collocated with the surface water samples described in the previous bullet. Samples were analyzed for nitroaromatics, TAL metals, SVOCs, and PCBs. In addition, two samples were analyzed for TOC.

All analytical data from these samples were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the EPA *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b), the QAPP (Shaw, 2008b), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project data quality objectives (DQO). The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to National Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993). Additional information on data evaluation, data validation, and data quality are provided in the SCR and information attached therein (Appendix A).

3.2.2 Physical Characteristics

3.2.2.1 Local Soils

Ten of the 17 soil borings drilled within the former ash pit encountered native soil at a depth of approximately 1 foot bgs. At boring locations that did not encounter fill material, black ash and cinders were visible on the ground surface. Below the ash layer, native soil consisted of a glacial till, glacial outwash, or a glacial lacustrine (lake) deposit. In general, a loose, mottled, very fine-grain, brownish-colored sand on the western side of the ash pit and a soft, grayish-colored silt in

the central and eastern side was first encountered. Below the sand-silt, a stiff, low-plasticity, silty clay was encountered that continued to the top of bedrock (Olentangy Shale), typically encountered at a depth of 20 feet bgs.

3.2.2.2 Local Geology

Bedrock units encountered at AP1 are of Devonian age and consist of the Olentangy Shale and the underlying Delaware Limestone. Six piezometers advanced to refusal are believed to have encountered the Olentangy Shale at depths ranging from 18 to 19.6 feet bgs, but could not be confirmed because no refusal material was recovered. Monitoring wells AP1-MW02, AP1-BEDGW-001, and AP1-BEDGW-002 encountered the shale at respective depths of 20.5, 25.5, and 21.4 feet bgs (elevations of 623.2, 616.3, and 613.1 feet amsl, respectively). The Delaware Limestone was encountered in well AP1-BEDGW-001 at a depth of 44.6 feet (597.20 feet amsl) and in well AP1-BEDGW-002 at a depth of 39.5 feet (595 feet amsl).

As determined by rock core recovery during borehole drilling for bedrock monitoring wells AP1-BEDGW-001 and AP1-BEDGW-002, the Olentangy Shale at AP1 is typically gray to dark gray in color, highly weathered near the soil bedrock interface, thinly laminated, and friable. Competency of the shale increased with depth. The Olentangy Shale at AP1 was not encountered in borings AP1-MW01 and AP1-MW03, completed for the overburden/shale wells, because they were not advanced to refusal. The Delaware Limestone below the shale was typically found to be dark gray in color, hard, slightly weathered, and fossiliferous (including brachiopods and corals), and to exhibit massive bedding. Pyrite crystals were found on several cores. In addition, during drilling for monitoring well AP1-BEDGW-001 at around 57, 62, and 66 feet bgs, petroleum hydrocarbon was found seeping from the rock core. Naturally occurring petroleum hydrocarbons are common regionally in the Delaware Limestone.

3.2.2.3 Local Hydrogeology

Overburden/shale groundwater at AP1 was encountered at depths ranging from 4 feet bgs (PZ04, SB-02, SB-04, and SB-05) to 10.4 feet bgs (PZ02) in December 2008 (dry season) during soil boring drilling/piezometer installation. During monitoring well installation conducted in March 2009 (wet season), overburden/shale groundwater was encountered at the shallow depth of 1 foot in two of the five monitoring wells, while the greatest depth was only 2.2 feet (AP1-MW01). Due to a medium to very stiff clay preventing the detection of groundwater, the depth at which groundwater was encountered in well AP1-MW03 is unknown. As shown by the May 26, 2009 overburden/shale groundwater elevation contour map (Figure 3-2), which includes water-level measurements from both the temporary piezometers and permanent monitoring wells, including the nearby Locomotive Building Area and Rail Car Washing Area wells, groundwater flow is in

a northwest and west direction toward an unnamed drainage ditch. Figure 3-3 presents an overburden/shale groundwater potentiometric map of water level measurements taken October 27, 2009 (dry season) from the overburden/shale monitoring wells (the piezometers were abandoned in July 2009). The groundwater flow direction during October 2009 is also in a northwest-west direction. Overburden/shale groundwater flow mimics the surface topography from both contour maps.

Two bedrock monitoring wells were installed at AP1. Well AP1-BEDGW-001 was installed in an upgradient position, south of the ash pit, and bedrock well AP1-BEDGW-002 was a source well installed within the ash pit on the north-central edge. Existing well IT-MNTA-BEDGW-001 was used as a downgradient well. Bedrock groundwater was encountered during March 2009 drilling of these wells in fractures at depths of 68 feet (AP1-BEDGW-001) and 51.3 feet (AP1-BEDGW-002). The screened interval of each of these wells is within the Delaware Limestone bedrock. Based on groundwater level measurements collected from these two bedrock wells, combined with those from other nearby bedrock wells that monitor the Locomotive Building Area and Waste Water Treatment Plant No. 1 sites, it was determined that the direction of bedrock groundwater flow underlying the vicinity of AP1 was toward the northwest. Figures 3-4 and 3-5 show the regional groundwater flow to be in a northwest direction toward a groundwater low, which bisects PBOW in a southwest-to-northeast direction.

3.2.2.4 Local Surface Water

There are no surface water features within AP1, but two unnamed tributaries receive drainage from AP1. The first, larger tributary is located approximately 40 feet west of the AP1 boundary and flows in a northeast direction. The smaller tributary is located north of Maintenance Road, approximately 50 feet north of AP1 (Figure 3-1), and drains northward into the larger unnamed tributary approximately 90 feet due north of Maintenance Road. This smaller tributary was investigated and evaluated as part of the Maintenance Garage Area (Locomotive Building Area RI [Shaw, 2010b]) and, thus, was not included as part of the AP1 RI.

The northern section of AP1, parallel to Maintenance Road and the northwest portion of the site, is low-lying and flat. Because of the general lack of topography at AP1, surface water tends to pool throughout the site in localized shallow depressions, including those made by tire tracks and heavy equipment driven on the site, such as during the RI sampling events. However, these shallow pools are only present after precipitation events. Generally, surface water flows from AP1 to the north or to the west. The ditch parallel to Maintenance Road carries localized surface water to the north through the culvert and into the small, unnamed tributary to the north. Surface water also drains toward the west, into the larger unnamed tributary.

3.2.3 Summary of Analytical Results

The analytical results of the RI samples described in Section 3.2.1 are summarized in this section. As part of this evaluation, analytes detected in the respective environmental media were compared to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in Tables 3-1 through 3-6 for the various environmental media. The derivation of RBSCs and BSCs are described in the AP1 BHHRA (Appendix B). RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks was performed in the BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified by bold text in Tables 3-1 through 3-6. Sampling locations where RBSCs and/or BSC were exceeded are shown on Figures 3-6 through 3-9.

The evaluation of the analytical results of the samples and analyses, as presented in the SCR, are summarized below for each medium.

Surface and Subsurface Soil Summary. The findings from AP1 surface and subsurface soil are summarized as follows:

- No nitroaromatics were detected in surface or subsurface soil samples at AP1.
- No PCBs were detected in subsurface soil samples. No PCBs were detected above RBSCs in surface soil.
- The SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected above RBSCs in the surface soil from boring SB-08.
- Among subsurface soil samples, only the SVOCs benzo(a)anthracene and indeno(1,2,3-cd)pyrene were detected above RBSCs, and only from boring SB-08 at the sample depth of 3 to 5 feet.
- Seven metals (aluminum, arsenic, beryllium, chromium, cobalt, iron, and manganese) were detected above the RBSCs in the surface soil in nearly all of the samples; and two metals, beryllium and mercury, were above BSC values. Beryllium was the only metal in the surface soil to exceed both the RBSC and BSC.
- Seven metals (aluminum, arsenic, cadmium, chromium, cobalt, iron, and manganese) were detected above the RBSCs in nearly all of the subsurface soil samples (except for cadmium, which was detected in only one sample). Three metals (beryllium,

magnesium, and manganese) were above BSC values. Manganese was the only metal to exceed both the RBSC and BSC in the subsurface soil.

Piezometer Overburden/Shale Groundwater Sample Summary. The major findings from AP1 piezometer groundwater are summarized as follows:

- Only one nitroaromatic, 4-amino-2,b-dinitrotoluene, was detected in the groundwater; and it was found in piezometer PZ-05 at a concentration far below the RBSC of 7.3 parts per billion.
- No SVOCs were detected in the groundwater samples.
- Aluminum, iron, and manganese exceeded both the RBSCs and the BSCs in the unfiltered sample.
- Only manganese exceeded both the RBSC and BSC in the filtered samples.

Monitoring Well Overburden/Shale Groundwater Sample Summary. Three groundwater samples were collected from newly installed wells during the wet season month of May 2009, and three were collected during the dry season month of November 2009. The findings are summarized as follows:

- No appreciable difference between the number of analytes detected was observed among the upgradient, source area, and downgradient monitoring wells or the time/season for sampling.

Upgradient (AP1-MW01)

- Nitroaromatics 2-nitrotoluene and 4-nitrotoluene were detected below the RBSC during the dry season sampling event in November 2009.
- VOC compound chloroform exceeded the RBSC during the wet season sampling event in May 2009.
- Three metals (arsenic, cobalt, and iron) exceeded the RBSCs and/or BSCs in the unfiltered and filtered groundwater samples.

Source Area (AP1-MW02)

- No nitroaromatics, VOCs, or SVOCs were detected during either sampling event.
- Seven metals exceeded the RBSCs and/or BSCs, but only iron exceeded both screening levels during the dry season (November) event in the filtered groundwater

sample. This indicates that the six other metals exceeded RBSCs and BSCs, likely associated with suspended particulates.

Downgradient (AP1-MW03)

- No nitroaromatics, VOCs, or SVOCs were detected in during either sampling event.
- Two metals (cobalt and manganese) exceeded the RBSCs in the unfiltered and filtered groundwater samples.

Limestone Bedrock Groundwater Sample Summary. Three groundwater samples were collected during the wet season month of May 2009, and three groundwater samples were collected during the dry season month of November 2009. The findings are summarized as follows:

- No appreciable difference between the number of analytes detected was observed between the upgradient, source area, and downgradient monitoring wells or time of season for the sampling.

Upgradient Well (AP1-BEDGW-001)

- Six VOCs exceeded RBSCs and four exceeded BSCs during the wet and dry season sampling events from upgradient bedrock well AP1-BEDGW-001. The petroleum hydrocarbon-related compounds benzene, ethylbenzene, toluene, and total xylenes were above RBSCs and BSCs during both sampling events. Chloroform was above the RBSC during the wet season, and methylene chloride was above the RBSC during both the wet (May) and dry (November) season.
- Two petroleum hydrocarbon-related SVOCs were detected above RBSCs during both sampling events: 2-methylnaphthalene and naphthalene.
- Nine metals exceeded the RBSCs and/or BSCs in the filtered and unfiltered groundwater samples during both sampling events, but only arsenic, iron, and manganese exceeded both screening levels during the groundwater sampling.

Source Area (AP1-BEDGW-002)

- Six VOCs exceeded RBSCs and four exceeded BSCs during the wet season sampling event from source area bedrock well AP1-BEDGW-002. The hydrocarbon-related compounds benzene, ethylbenzene, toluene, and total xylenes were above RBSCs and/or BSCs. Chloroform and chloromethane were also above the RBSCs during the dry season, and 1,1,2,2-tetrachloroethane was above the RBSC during the wet season.

- The petroleum hydrocarbon-related SVOC naphthalene was above the RBSC during the both the wet and dry season sampling events.

- Five metals exceeded the RBSCs and/or BSCs in the filtered and unfiltered groundwater samples during both sampling events, but only arsenic exceeded both screening levels during both the wet and dry season groundwater sampling.

- Cyanide exceeded the RBSC during the wet season (May) sampling event.

Downgradient (IT-MNTA-BEDGW-001)

- Six VOCs exceeded RBSCs and four exceeded BSCs during the wet and dry season sampling events from downgradient bedrock well IT-MNTA-BEDGW-001. The petroleum hydrocarbon-related compounds ethylbenzene, toluene, and total xylenes were above RBSCs and/or BSCs during both sampling events.

- Benzene was not detected during the wet season sampling but was above the RBSC and BSC during the dry season. Its presence is likely associated with naturally occurring petroleum hydrocarbons. Chloroform and methylene chloride were above the RBSCs during the wet season, and 1,1,2,2-tetrachloroethane was above the RBSC during the dry season.

- Two petroleum hydrocarbon-related SVOCs were detected above RBSCs during both sampling events: 2-methylnaphthalene and naphthalene.

- Two metals exceeded the BSCs in the filtered and unfiltered groundwater samples during both sampling events and manganese exceeded only the RBSC during the wet season. No compound exceeded both the RBSC and BSC.

Surface Water Summary. Four surface water samples were collected from AP1, three from the unnamed tributary located west of the site and one in a low, wet area in the northern portion of AP1. The findings from AP1 surface water are summarized as follows:

- No nitroaromatics, SVOCs, or PCBs were detected in any of the surface water samples.

- Arsenic, chromium, and lead were detected above RBSC levels in the sample located in the wet area in the northern portion of AP1. Each of these inorganics was detected above the RBSC only in this sample.

Sediment Summary. Four sediment samples were collocated with the surface water samples: three in the unnamed drainage ditch west of AP1 and one in the low-lying wet area in the northern portion of AP1. The findings from AP1 sediment are summarized as follows:

- No nitroaromatics were detected in the sediment samples.
- Eleven SVOCs were detected, 10 from the sample located in the wet area in the northern portion of AP1. Of these, only the PAHs benzo(a)pyrene and benzo(b)fluoranthene exceeded RBSCs and only in sample AP-SD01.
- Two PCBs (Aroclor 1254 and 1260) were detected below respective RBSCs in two samples.
- Arsenic and chromium are the only inorganics exceeding RBSCs; these were detected above the RBSCs in each sample.

The PAH exceedances in sediment were detected in sample AP1-SD04. This sample was collected from an area within AP1 in which water associated with precipitation events may collect and which is not an aquatic environment. Thus, this sample is likely analogous to surface soil.

3.3 Baseline Human Health Risk Assessment

This section provides a summary of the AP1 BHHRA report (Shaw, 2011a), which is included as Appendix B. It is important to note that this site-specific risk assessment, including the evaluation of future land use and groundwater use, was performed to satisfy administrative requirements. All data and other information presented in this section have been previously presented in the full BHHRA and/or SCR (Appendix A) reports. This BHHRA is consistent with EPA guidance and with the procedures established in the BHHRA for TNTA and TNTC soil (IT, 2001a), the BHHRA for groundwater at PBOW (Shaw, 2006) and the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009a).

3.3.1 Identification of Chemicals of Potential Concern

A screening process is used to identify chemicals of potential concern (COPC), which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC screening includes a risk-based screen which also considers status as a human nutrient, a frequency-of-detection evaluation, and a background screen (Appendix B).

The COPCs for each of the AP1 media are identified as follows:

- ***Surface Soil*** – Aluminum, beryllium, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene

- ***Subsurface Soil*** – Cadmium, manganese, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene
- ***Total Soil*** – Aluminum, beryllium, cadmium, manganese, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene
- ***Bedrock Groundwater*** – Antimony, arsenic, iron, manganese, thallium, 2-methylnaphthalene, naphthalene, benzene, chloroform, chloromethane, ethylbenzene, methylene chloride, 1,1,2,2-tetrachloroethane, toluene, xylenes, cyanide
- ***Overburden Groundwater*** – Cobalt, iron, manganese, thallium, chloroform, sulfate
- ***Sediment*** – Arsenic, chromium, benzo(a)pyrene, benzo(b)fluoranthene
- ***Surface Water*** – Arsenic, chromium.

A summary of the COPC screening process and identification is shown in Tables 3-7 through 3-13 for surface soil, subsurface soil, total soil, bedrock groundwater, overburden/shale groundwater, sediment, and surface water, respectively. As discussed in Appendix B, the total soil COPCs include all surface soil and subsurface soil COPCs.

3.3.2 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989). The AP1 BHHRA characterizes potential exposure to COPCs in AP1 environmental media as portrayed by the conceptual site exposure model (CSEM).

The CSEM provides the basis for identifying and evaluating the potential risks to human health in the BHHRA. The CSEM, graphically depicted on Figure 3-10, includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways.
The receptors and pathways on Figure 3-10 reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by Dames and Moore, Inc., (D&M) (1997) and the sitewide groundwater investigation (IT, 1997b).

No current or future exposure to off-site residents is evaluated because off-site residents are serviced by municipal water from surface water sources. Although there are numerous private groundwater wells in the vicinity, including several within 1 mile of the facility boundary, none of these are used as a potable source.

Based on the investigations of other PBOW sites, natural hydrocarbons and hydrogen sulfide are known to be present within the bedrock limestone, and shale formation groundwater generally provides low yields and is of low quality. Consistent with these observations, the groundwater underlying AP1 provides low yield and is of naturally low quality (Section 2.4.1). However, the groundwater underlying AP1 was not summarily excluded for consideration as a tap water source because OEPA has maintained that an assumption of potable use should initially be made under baseline conditions where no prior use restrictions are in place. Therefore, the development of groundwater for hypothetical on-site residential and on-site worker use as tap water was evaluated for purposes of this BHHRA at the request of OEPA. Groundwater quality and use are discussed further in Section 2.4.1.

Exposure associated with the COPCs was evaluated using the following receptors. Each medium that is quantitatively evaluated for each receptor (provided that COPCs are identified for that medium) is listed in parentheses:

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil, bedrock groundwater, and overburden/shale groundwater)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only], bedrock groundwater, and overburden/shale groundwater)
- Current/future construction worker (total soil, surface water, and sediment)
- Hypothetical future resident (total soil, surface water, sediment, overburden/shale groundwater, and bedrock groundwater)
- Future hunter (surface soil, including venison pathway)
- Future hunter's child (surface soil [venison pathway only]).

The resident was evaluated for noncancer hazards separately for the young child (ages 1 through 6 years) and adult life stages, and the noncancer hazard results are presented separately for the child and adult residents. Cancer risk results for the child and adult resident were evaluated based on a 30-year combined child/adult exposure duration and are presented as combined child/adult cancer risks.

The equations for the calculations of intake values for each exposure pathway, exposure assumptions, and the calculation of exposure point concentrations (EPCs) of COPCs for modeled pathways (e.g., venison, airborne concentrations) are presented in the BHHRA (Appendix B).

3.3.3 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of COPCs. Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects. The equations and input values used to calculate cancer risks and noncancer hazards are included in Appendix B.

3.3.3.1 Cancer Risk

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime and is called the incremental lifetime cancer risk (ILCR).

Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); this range is referred to as the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk management range. Risks less than this range are regarded as negligible. A target cancer risk goal of 1E-5 was selected by the PBOW Project Delivery Team as a basis to consider remedial action. Use of this 1E-5 goal represents a departure from the Army's practice of generally using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations.

3.3.3.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with a chemical-specific chronic reference dose (RfD) as described in the BHHRA (Appendix B). A hazard quotient (HQ) of 1 indicates that the estimated intake equals the RfD. If the HQ is greater than 1, there may be concern for potential adverse health effects. In the case of simultaneous exposure of a receptor to multiple chemicals, a hazard index (HI) is calculated as the sum of the HQs.

A total HI is calculated as the sum of all HI values, including all media and all COPCs, for a given receptor. Calculating a total HI as the sum of HQ values is based on the assumption that the potential for noncancer effects is additive. EPA (1989), however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism. Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ, as described in Appendix B.

3.3.3.3 Risk Characterization Results

Cancer and noncancer risk characterization results were evaluated in the BHHRA for each AP1 environmental medium and each receptor scenario using the methods summarized in Sections 3.3.3.1 and 3.3.3.2 and described in Appendix B.

Risk characterization for each receptor scenario that includes groundwater exposure was run separately for overburden/shale groundwater and limestone bedrock groundwater. The cancer risks and noncancer hazards for each receptor exposed to AP1 are shown in Table 3-14.

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk criteria (ILCR>1E-5) are shown as bold and exceedances of the noncancer hazard criterion (HI>1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics:

- Current groundskeeper: ILCR = 5E-6; HI = 0.2
- Future groundskeeper – all pathways including bedrock groundwater use: ***ILCR = 9E-4; HI = 9***
- Future groundskeeper – all pathways including overburden/shale groundwater use: ILCR = 2E-6; ***HI = 13***
- Future groundskeeper – all pathways excluding groundwater use: ILCR = 5E-6; HI = 0.2
- Future indoor worker – all pathways including bedrock groundwater use: ***ILCR = 8E-4; HI = 9***
- Future indoor worker – all pathways including overburden/shale groundwater use: ILCR = 1E-6; ***HI = 13***
- Future indoor worker – all pathways excluding groundwater use: ILCR = 1E-6; HI = 0.008
- Current/future construction worker: ILCR = 8E-7; HI = 0.9
- Hypothetical future resident – all pathways including bedrock groundwater use: ***ILCR = 6E-3***; ***child HI = 134***; ***adult HI = 58***
- Hypothetical future resident – all pathways including overburden/shale groundwater use: ILCR = 9E-6; ***child HI = 82***; ***adult HI = 35***
- Future resident – all pathways excluding groundwater use: ILCR = 9E-6; child HI = 0.3; adult HI = 0.03
- Future hunter: ILCR = 3E-7; HI = 0.0009

- Future hunter's child: None of the COPCs are bioaccumulative; risks and hazards are assumed to be de minimis.

The HI values shown in Table 3-14 that include the total soil exposure pathways (i.e., future groundskeeper, current/future construction worker, and future resident) do not include the contribution of manganese that were quantified in the BHHRA. Further evaluation in the BHHRA uncertainty analysis (Appendix B) identified the concentrations of manganese present in subsurface soil as unrelated to former site operations.

3.3.4 BHHRA Conclusions

The ILCR of the AP1 future groundskeeper, indoor worker, and resident that is hypothetically assumed to use bedrock groundwater as household tap water exceeds the NCP risk management range as well as the PBOW target cancer risk criterion. The HI values of these receptors, if assumed to use either the bedrock or overburden/shale groundwater as a potable source, also exceed the target criterion of 1, indicating that adverse human health risks cannot be regarded as unlikely to occur under these hypothetical scenarios. Cancer risks and noncancer hazards to all other potential AP1 receptors evaluated under current or future land use are within or less than the NCP risk management range, less than the target HI criterion, and less than the PBOW cancer risk criterion, indicating that cancer risks are at acceptable levels and adverse noncancer effects are unlikely to occur under potential current scenarios. These conclusions also apply to the future groundskeeper, indoor worker, and resident not assumed to use bedrock or overburden/shale groundwater. Note that even though the current groundskeeper is used to represent a maximum exposure under current potential land use (i.e., NASA control), there does not appear to have been any groundskeeping activities at AP1 during recent decades, except in the extreme northern portion of the site immediately adjacent to Maintenance Road.

The cancer risks and noncancer hazards associated with bedrock groundwater are nearly entirely attributable to natural petroleum-related compounds and arsenic. The highest ILCR and HI values under the assumption of bedrock groundwater use are associated with the future resident receptor: the bedrock groundwater ILCR is 6×10^{-3}, and the HI values for the resident child and adult are 134 and 58, respectively. The ILCR associated only with petroleum hydrocarbon compounds and arsenic in groundwater for the resident is 6×10^{-3}, and the HI values associated only with petroleum hydrocarbons and arsenic for the resident child and adult are 123 (arsenic HQ=23; HI of multiple petroleum hydrocarbons=100) and 53 (arsenic HQ=10; HI of multiple petroleum hydrocarbons=43), respectively.

The noncancer hazards associated with overburden/shale groundwater are due to manganese and thallium concentrations from upgradient well AP1-MW01 (thallium was detected in only one sample). The highest HI values under the assumption of overburden groundwater use are associated with the future resident receptor: the HI values for the resident child and adult are 82 and 35, respectively. The HI values were found to be nearly entirely associated with the presence of manganese and thallium in overburden groundwater. The HI values associated only with manganese and thallium in groundwater for the resident child and adult are 77 (manganese HQ=46; thallium HQ=31) and 33 (manganese HQ=20; thallium HQ=13), respectively. Based on a lack of elevated concentrations of these analytes in other overburden/shale groundwater samples and the fact that well AP1-MW01 is upgradient to AP1, it appears doubtful that the elevated concentrations are attributable to former site activities. Use of either the overburden/shale or bedrock groundwater is regarded as implausible because of insufficient yield. Additionally, the naturally poor quality of the bedrock groundwater and associated hydrogen sulfide off-gassing make it unsuitable as a potable source. In summary, exposure to AP1 groundwater is regarded as implausible and, regardless, the risk-driving and hazard-driving analytes are not related to former site activities.

3.4 Screening-Level Ecological Risk Assessment

This section provides a summary of the SLERA report for AP1 (Shaw, 2011b), which is included as Appendix C. It is important to note that this SLERA was performed to satisfy administrative requirements, including those described by FUDS regulations (USACE, 2004). All data and other information presented herein has been previously presented in the full AP1 SLERA and/or SCR reports (Appendices C and A, respectively).

The SLERA was performed to evaluate and provide an estimate of current and future ecological hazard associated with exposure to potential releases to soil, surface water, and sediment from AP1. This summary provides an ecological site description, identifies chemicals of potential ecological concern (COPEC), identifies ecological receptors, characterizes exposure, characterizes ecological risks, and presents the conclusions of the SLERA.

The AP1 SLERA is consistent with EPA guidance and with the procedures established in previous risk assessments performed at PBOW (e.g., the SLERA for TNT Area A [TNTA] and TNT Area C [TNTC] [IT, 2001b]) as well as the AP1 SLERA work plan (Shaw, 2009b).

3.4.1 Ecological Site Description

This section summarizes the general discussion of site background and the area of concern, surface water resources, wetlands, and vegetative communities; a species inventory; and a

discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities discussed in Sections 3.4.1.1 and 3.4.1.2. Additional ecological site description is provided in Appendix C.

3.4.1.1 Site Background

PBOW is part of the Lake Plains region. Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (ODNR, 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second-generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within the greater context of primarily agricultural land in north-central Ohio.

AP1 is approximately 2 acres in size. The site is located in a flat depression that is lower in elevation than Maintenance Road, which borders the site to the north.

3.4.1.2 Site Reconnaissance

Ecologists performed site visits to AP1 on October 16, 2008 and April 27 and June 2, 2009. These visits were performed at different times of year to identify early- and late-blooming plant species (especially threatened or endangered) and to identify migrating and nesting bird species. These site visits were also used to compile lists of other fauna observed at the site. No federally or state-listed species were observed. A full species list is presented in the SLERA (Appendix C).

Prior to arrival at PBOW, site personnel obtained maps and other relevant site information and determined the locations of potential ecological units such as streams, creeks, ponds, grasslands, forest, and wetlands on or near the site. The locations of known or potential contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Reconnaissance personnel used the site visit to evaluate the site for more subtle clues of potential effects from contaminant release. Information obtained during the reconnaissance trips was used to select representative receptors, refine exposure scenarios for the risk assessment, and identify protected species or habitats of special concern in the study area.

3.4.1.3 Surface Water

There are no surface water features within AP1, but two unnamed tributaries receive drainage from AP1. The first, larger tributary is located approximately 40 feet west of AP1 and flows in a northeast direction. The smaller tributary is located north of Maintenance Road, approximately 50 feet north of AP1 (Figure 3-1). Although surface water features that would support a viable aquatic ecological community do not exist within the AP1 site boundary, the unnamed tributaries represent an aquatic habitat that receives runoff from, and could be impacted by, any contamination present at AP1. The smaller unnamed tributary to the north, which drains into the larger unnamed tributary approximately 90 feet due north of Maintenance Road, was investigated and evaluated as part of the Maintenance Garage Area (Locomotive Building Area RI [Shaw, 2010b; 2011d]), and thus was not included in the AP1 SLERA.

Water associated with precipitation events tends to pool throughout the site in localized shallow depressions, including those made by tires. An east-west ditch parallel to the southern edge of Maintenance Road carries localized surface water to the north through the culvert under Maintenance Road and into the small, unnamed tributary to the north. Surface water also drains toward the west, into the larger unnamed tributary.

3.4.1.4 Wetlands

According to the National Wetland Inventory (NWI) maps for the area (U.S. Fish and Wildlife Service, 2013), there are no designated wetlands at the AP1 site. It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes (such as those present at PBOW), because minor depressions often contain isolated wetlands not easily identified through interpretation of aerial photographs (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). It should also be noted that the NWI map classification may have been based on previous anthropogenic conditions.

Subsequent to completion of the RI, a wetland delineation of the NASA Plum Brook Station, including AP2, was performed for NASA and the results were provided in a delineation report (EnviroScience, Inc., 2012). Based on this report, two wetland areas exist within the AP1 study area, and riparian wetlands exist along the larger unnamed tributary described in Section 3.2.1.3 that flows toward the northeast (Figure 3-1). The larger (approximately 0.3 acre) of these two areas is in the eastern half of the study area, and the smaller (approximately 0.6 acre) wetland area is in the western part of the study area. The findings of the EnviroScience, Inc. (2012) wetland report have not been verified by the USACE.

3.4.1.5 Vegetative Communities

Vegetative communities at AP1 were classified during the site reconnaissance trips (Figure 2-2 of Appendix C). AP1 contains dense shrub thickets and old field vegetation. An area of scrub/shrub wetland vegetation is found along Maintenance Road. Vegetative stress attributable to chemicals was not observed at AP1, and there was no evidence that significant ecological threats exist at the site. During the June 2009 visit, a few locations devoid of vegetation were observed where heavy equipment had been deployed during sampling events earlier in the year. Based on site reconnaissance information, AP1 represents a relatively undisturbed (albeit small) parcel of shrub-thicket habitat that is capable of supporting ecological receptors.

3.4.1.6 Species Inventory

A total of 114 plant species were documented at AP1 during the early summer and fall vegetation surveys. One mammal species (white-tailed deer) and 11 bird species were observed during spring and fall field reconnaissance, including 9 which were present during the breeding season. No amphibian or reptile species were observed during the site reconnaissance. No aquatic habitat that could support fish species is present within AP1. Aquatic habitat sufficient to support fish populations is limited in the unnamed tributary west of AP1, and no fish were observed in the tributary during AP1 site reconnaissance. However, based on observations in streams within PBOW, it is likely that small fish species are present in this tributary.

3.4.2 Identification of Chemicals of Potential Ecological Concern

A screening process was performed on the analytical data from the RI and SI to identify COPECs that may pose a threat to ecological receptors. These data include all soil samples collected to a depth of 6 feet, surface water samples, and sediment samples. Groundwater was excluded because exposure to this AP1 medium is considered to be an incomplete pathway for ecological receptors. Sample locations are presented on Figure 3-1.

The COPEC selection process was performed to develop a subset of chemicals detected at the site that are not naturally occurring or associated with non-site-related sources. These chemicals may also be present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. This selection process and the screening values used for COPEC selection are described in the SLERA (Appendix C). The results of the COPEC screening are presented in Tables 3-15 through 3-17 for soil, surface water, and sediment at AP1. Six chemicals were identified as COPECs in soil, nine were selected in surface water, and seven were selected in sediment at AP1.

Chemicals identified as COPECs were quantitatively evaluated where chemical-specific data were available in the SLERA predictive evaluation, which is summarized in Sections 3.4.3 through 3.4.6.

3.4.3 Selection of Ecological Receptors

Ecological assessment receptors were selected in the SLERA to focus the exposure characterization on species, groups of species, or functional groups that are directly related to the following assessment endpoints: the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, and carnivorous birds.

As part of this receptor selection process, site biota were organized into major functional groups. For terrestrial communities, the major groups are plants and wildlife, including terrestrial invertebrates, mammals, and birds.

Seven representative terrestrial receptor species that are expected or possible in the area of AP3 (based on the ecological description of the site presented in Section 5.1) were selected as indicator species for the potential effects of COPECs. These indicator species represent two classes of vertebrate wildlife (mammals and birds); include a range of both body size and food habits; and include herbivores, omnivores, and carnivores. The seven terrestrial species selected include the deer mouse (small omnivorous mammal), short-tailed shrew (small insectivorous mammal), Eastern cottontail rabbit (medium-sized terrestrial herbivorous mammal), marsh wren (small insectivorous bird), raccoon (medium-sized omnivorous mammal), white-tailed deer (large herbivorous mammal), and red-tailed hawk (large carnivorous bird).

Exposure to aquatic organisms in the ditches and wet areas is assumed to occur via direct exposure to contaminants in the water column and via prey exposed to contaminants in surface water and sediment. Potential uptake through the aquatic food chain is evaluated for the raccoon (also considered as a terrestrial receptor) and muskrat (medium-sized aquatic herbivorous mammal).

A terrestrial food web is presented on Figure 3-11, and an aquatic food web is presented on Figure 3-12. Many of the species evaluated, particularly the deer mouse, cottontail rabbit, short-tailed shrew, and marsh wren, have limited home ranges that make them particularly vulnerable to exposure from site contaminants. Further discussion of the selection of ecological receptors is provided in Appendix C.

3.4.4 Exposure Characterization

Ecological routes of exposure for biota may be direct (bioconcentration) or through the food web via the consumption of contaminated organisms (biomagnification). Exposure to soil, surface water, and sediment was evaluated for the pertinent representative terrestrial and aquatic assessment receptors, as described in Appendix C. Direct exposure routes include dermal contact, absorption, inhalation, and ingestion. Further discussion of exposure routes is provided in Appendix C.

Daily doses of COPECs for vertebrate receptors were calculated using standard exposure algorithms. These algorithms incorporate species-specific natural history parameters (e.g., feeding rates, water ingestion rates, and dietary composition) as well as site-specific area use factors. These algorithms are presented and described in the SLERA (Appendix C).

3.4.5 Risk Characterization

The risk characterization phase integrates information on exposure, exposure-effects relationships, and defined or presumed target populations. Qualitative and semiquantitative approaches were used to estimate the likelihood of adverse effects occurring as a result of exposure of the selected site receptors to COPECs.

Food chain modeling was used to estimate exposure rates for the representative assessment receptors. These exposure rates were compared with toxicity reference values (TRV) to calculate ecological hazard quotients (EHQ) for wildlife receptors (Wentsel et al., 1996). Only conservative TRVs based on a no-observed-adverse-effects level (NOAEL) were used in the food chain model. EHQs are calculated by summing intake doses across all exposure pathways for each chemical for a given receptor and dividing by the TRV. EHQs less than or equal to 1 represent no probable hazard. Although OEPA considers all EHQs above 1 to be potentially significant, the following uncertainties regarding EHQ interpretation are noted:

- EHQs are not measures of risk.
- EHQs are not population based.
- EHQs are not linearly scaled.
- EHQs are often produced that are unrealistically high and toxicologically impossible (e.g., estimated EHQs greater than 1,000).
- Trace soil concentrations of inorganic chemicals (including concentrations well below background levels) can lead to EHQ threshold exceedances.

The following interpretation of EHQ ranges from Wentsel et al. (1996) takes into consideration the uncertainties inherent in EHQs and provides a basis for possible recommendations:

- EHQs from 1 to less than 10 represent a low potential for environmental effects.
- EHQs from 10 to less than 100 represent a significant potential that effects could result from greater exposure.
- EHQs greater than 100 represent the highest potential for expected effects.

Therefore, it should be understood that EHQs greater than 1 do not mean that adverse ecological effects are occurring at the site or may occur in the future. Table 3-18 summarizes the NOAEL-based EHQs for the seven evaluated terrestrial assessment receptors and two aquatic receptors, as presented in Section 5.3 of the SLERA (Appendix C). Note that the raccoon includes both terrestrial and aquatic components.

3.4.6 SLERA Conclusions

No assessment receptor exceeded an EHQ of 1 for any chemical detected at AP1. Therefore, the potential for adverse ecological impacts is considered to be very low at this site, and no chemicals are identified for further evaluation for protection of the environment at AP1.

4.0 Coal Yard No. 1

This chapter provides a summary of the sampling, analyses, results, and evaluation of the environmental media associated with CY1 (i.e., surface and subsurface soil) that have been presented in the AP1 and AP3 SCR (Appendix D), BHHRA (Appendix E), and SLERA (Appendix F) Addenda for CY1. The reference for each of these documents is provided below:

- Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013a, ***Final, Ash Pit No. 1 Baseline Human Health Risk Assessment Addendum For Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013b, ***Final, Ash Pit No. 1 Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 1, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Please note that this chapter provides no data or other information that has not been previously presented in the SCR, BHHRA, or SLERA Addenda for CY1 (Appendices D, E, and F, respectively).

4.1 Previous Investigation and Evaluation

No previous environmental investigations of CY1 have been conducted.

4.2 Site Characterization and Evaluation

This section summarizes the RI sampling of surface soil and subsurface soil at CY1, the analytical results, and an evaluation of these results that are presented in the SCR addendum, referred to hereinafter as the “CY1 SCR.”. Additional details are provided in the CY1 SCR (Appendix D).

4.2.1 Samples and Analyses

The RI samples were collected consistent with the site-specific QAPP (Shaw, 2008b) and site-specific sampling and analysis plan (Shaw, 2011e). Soil sampling locations are shown on Figure 4-1.

Four surface soil samples and 10 subsurface soil samples, including one QA field split sample and one QC field duplicate sample, were collected from four soil borings drilled at CY1. Soil samples were collected from approximate depths of 0 to 1, 3 to 5, and 8 to 10 feet bgs. Generally, surface soil is defined as samples collected from a depth interval beginning at 0 to 1 foot bgs and subsurface soil is defined as samples collected from depth intervals starting at greater than 1 foot bgs. The surface soil sampling interval was adjusted so that the surface sample interval was based on the interpreted native surface soil prior to construction of PBOW in 1941. This interpretation was made in the field based on boring log results and site knowledge of native soils. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. Also, surface soil samples and those collected from a depth interval of 3 to 5 feet bgs were analyzed for PCBs.

The following list summarizes the samples and analyses collected for the RI:

- ***Surface Soil*** – Four samples were analyzed for nitroaromatics, SVOCs, TAL metals, and PCBs, and one sample was analyzed for TOC.
- ***Subsurface Soil*** - Six samples, including one QC field duplicate sample and one QA field split sample, from within an overall depth interval of 3 to 5 feet were analyzed for nitroaromatics, SVOCs, TAL metals, and PCBs. Four samples from within a depth interval of 8 to 10 feet were analyzed for nitroaromatics, TAL metals, and SVOCs.

All analytical data from these samples were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the EPA *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b), the QAPP (Shaw, 2008b), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project DQOs. The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to National Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993). Additional information on data evaluation, data validation, and data quality are provided in the CY1 SCR and information therein (Appendix D).

4.2.2 Physical Characteristics

Descriptions and information regarding the local geography, topography, surface drainage, local geology and hydrogeology characteristics, and precipitation influence effects on local water levels for AP1 are summarized in Section 3.2. This information is also applicable or assumed to be applicable for the adjacent CY1. Please note that no surface water bodies or drainage features were identified at CY1. A description of the local soils is the only information in this section that is specific to CY1.

CY1 Local Soils. The ground surface at two of the four soil borings (CY1-SB01 and CY1-SB03) was covered with a mixture of black sand, silt, and coal to a depth of approximately 0.5 foot. A sand, silt, and coal mixture was slightly thinner at boring CY1-SB02, with a thickness of only 0.3 foot. At the fourth boring (CY1-SB04), the first 1 foot of surface soil consisted of a mixture of black silt with clay, coal, and sand. Figure 4-1 shows a CY1 site map with soil boring locations.

Below the silt, clay, sand, and coal surface soil, a layer of yellowish-brown, very fine-grain sand with silt of loose consistency was typically encountered to a depth ranging from 3 to 4 feet. This material could be fill material based upon the depth and uniqueness of a fine-grain sand-silt near the surface. Note that this material was interpreted in the field to be native surface soil (Section 4.2.1). Cinders were encountered in boring CY1-SB01 at a depth of 4 to 6 feet bgs, below the fine-grain sand and silt. It is possible that this sand with silt was a former parking area, the base for either the parking area or coal storage, or used to level the ground surface during construction of the powerhouse.

Based on further evaluation, native soil is believed to have been first encountered in the borings at depths ranging from 3 feet bgs in borings CY1-SB01, CY1-SB03 and CY1-SB04 to 6 feet bgs in boring CY1-SB02. Native soil consists of glacial till, glacial outwash, or possibly a glacial lacustrine (lake) deposit. In three of the four soil borings (CY1-SB01, CY1-SB03, and CY1-SB04), typically a stiff silt with clay or clay with silt was encountered to the total boring depth of 10 feet. The color of the silt or clay was usually gray except in boring CY1-SB02, where it was an olive brown which gradually changed to a dark yellowish brown at a depth of approximately 8 feet. Depth to groundwater varied from 0.5 foot bgs in CY1-SB01 to 1.5 feet bgs in boring CY1-SB02, and groundwater was not encountered in the remaining two borings (CY1-SB03 and CY1-SB04).

4.2.3 Summary of Analytical Results

The analytical results of the CY1 RI samples described in Section 4.2.1 are summarized in this section. As part of this evaluation, analytes detected in the respective environmental media were compared to RBSCs and BSCs as points of reference only. Concentrations of soil analytes that exceed the RBSCs are highlighted in Table 4-1. The derivation of RBSCs and BSCs is described in the AP1 BHHRA addendum for CY1, hereinafter referred to as the "CY1 BHHRA" (Appendix E). RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks was performed in the CY1 BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified by bold text in Table 4-1.

The evaluation of the analytical results of the samples and analyses, as presented in the SCR, are summarized below.

Surface and Subsurface Soil Summary. The findings from CY1 surface and subsurface soil are summarized as follows:

Surface Soil

- No nitroaromatics or PCBs were detected in surface soil samples.
- Six SVOCs were detected, but all were below respective RBSCs.
- No TAL metals were detected above both the RBSC and BSC screening values.

Subsurface Soil

- No nitroaromatics or PCBs were detected in subsurface soil samples.
- Seven SVOCs were detected, but all were below their respective RBSC in subsurface soil samples.
- The TAL metal thallium was detected above the RBSC and BSC value in one 3 to 5 feet subsurface soil sample (QA field split sample), but the result is questionable because it was not detected in the regular or the QC field duplicate sample.

4.3 Baseline Human Health Risk Assessment

This section provides a summary of the CY1 BHHRA (Shaw, 2013a). It is important to note that this site-specific risk assessment was performed to satisfy administrative requirements. All data and other information presented in this section have been previously presented in the full BHHRA and/or SCR (Appendix D) reports. This BHHRA is consistent with EPA guidance and with the procedures established in the BHHRA for TNTA and TNTC soil (IT, 2001a), the

BHHRA for groundwater at PBOW (Shaw, 2006) and the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009a). Groundwater underlying CY1 was not specifically evaluated for human health risks in the CY1 BHHRA because the groundwater evaluated in the AP1 BHHRA is regarded as representative of CY1 as well.

4.3.1 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs for the risk assessment and to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. The COPC screening includes a risk-based screen which also considers status as a human nutrient, a frequency-of-detection evaluation, and a background screen (Appendix E).

None of the chemicals detected in CY1 surface soil (Table 4-2) or subsurface soil (Table 4-3) are COPCs. This result indicates that the cancer risks and noncancer hazards associated with exposure to CY1 soils are negligible and/or are not greater than those associated with background soils. Therefore, a quantitative risk assessment (exposure assessment, toxicity assessment, and risk characterization [EPA, 1989]) is not necessary and was not performed.

4.3.2 Baseline Human Health Risk Assessment Conclusions

None of the chemicals detected in CY1 surface soil or subsurface soil were identified as COPCs, indicating that the risks/hazards associated with potential exposure to chemicals detected in CY1 soils are negligible and/or are related to background soil conditions.

4.4 Screening-Level Ecological Risk Assessment

This section provides a summary of the SLERA report for CY1 (Shaw, 2013b), which is included as Appendix F and referred to hereinafter as the “CY1 SLERA.” It is important to note that this SLERA was performed to satisfy administrative requirements, including those described by FUDS regulations (USACE, 2004). All data and other information presented herein have been previously presented in the full CY1 SLERA and/or SCR reports (Appendix D).

The SLERA was performed to evaluate and provide an estimate of current and future ecological hazard associated with exposure to potential releases to soil, surface water, and sediment from the AP1 CY1. This summary provides an ecological site description, identifies COPECs, and presents the conclusions of the SLERA. The CY1 SLERA is consistent with EPA guidance and with the procedures established in previous risk assessments performed at PBOW (e.g., the SLERA for TNTA and TNTC [IT, 2001b]) as well as the AP1 SLERA work plan (Shaw, 2009b).

4.4.1 Ecological Site Description

Ecological characterization of the study area was based on a compilation of existing ecological information. Because CY1 is in such close proximity to AP1, a formal ecological reconnaissance was not performed for CY1. Rather, the habitat description, sensitive ecological resources, and faunal assemblages (including potential threatened and endangered species) described in the AP1 SLERA (Shaw, 2013b) were determined to also be relevant for the CY1 site. Also, a trained ecologist visited CY1 in September 2011 to make general observations of site conditions. Photographs taken during this visit are presented in Appendix F.

CY1 is located immediately south of Powerhouse No. 1 (Figure 1-2). Descriptions of the ecological resources in the vicinity of the CY1, including common flora and fauna species in the area, potential for threatened or endangered species, and local habitats, are included in the AP1 SLERA (Shaw, 2013b).

The CY1 area is primarily covered by herbaceous and shrubby vegetation, with early successional forest present near the perimeter of the site. The former CY1 area has minimal relief, and no water bodies are present at the site.

4.4.2 Identification of Chemicals of Potential Ecological Concern

A screening process was performed on the CY1 analytical data from the RI to identify COPECs that may pose a threat to ecological receptors. These data include all CY1 soil samples collected to a depth of 6 feet. Sample locations are presented on Figure 4-1.

The COPEC selection process was performed to develop a subset of chemicals detected at the site that are not naturally occurring or associated with non-site-related sources. These chemicals may also be present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. Screening criteria and the selection process that were used to identify COPECs are described in more detail in Appendix F. The results of the COPEC soil screening are presented in Table 4-4.

Cadmium and dibenzofuran were the only two chemicals identified as COPECs following the initial screening step (Table 4-4). It was determined in the SLERA that further evaluation of these two COPECs for potential adverse ecological effects was not necessary.

Cadmium was only detected in three samples at concentrations that marginally exceeded its conservative ecological screening value (ESV). This ESV is based on protection of a shrew receptor. The SLERA concluded that it is highly unlikely cadmium concentrations in CY1 soil

would potentially result in adverse population-level effects to shrews or other small based on the following factors: 1) samples that exceed the ESV represent a very small spatial area, 2) the highest concentrations of cadmium at CY1 are relatively low and only marginally exceed the conservative ESV, and 3) the natural population dynamics of small mammals allow for rapid compensation of any localized effects, if such effects would occur. Further, the presence of cadmium may be background-related, as a concentration gradient indicative of a release was not observed in the CY1 data set. Even though the background soil data set for cadmium would not allow for a statistically based comparison to cadmium in CY1 soil, only one of the CY1 detections of cadmium exceeded the minimum reporting limit (0.57 milligrams per kilogram [mg/kg]) for the background data set, and this maximum CY1 soil concentration (0.8 mg/kg) was less than the maximum reporting limit for the background soil data set (1.2 mg/kg).

Dibenzofuran was detected in a single soil sample at an estimated (i.e., "J"-qualified) concentration less than its reporting limit and was identified as a COPEC due to its lack of an ESV. Therefore, there is no evidence that dibenzofuran is toxic at the detected concentration. Dibenzofuran is a component of coal tar, which is made into creosote, a widely used wood preservative (Hazardous Substances Data Bank, 2013). Its presence in a single sample at a concentration below reporting limits suggests that this chemical is present neither as the result of a DoD-related release nor at sufficiently high concentrations to warrant concern for ecological receptors. The fact that the sample in which dibenzofuran was detected (CY005) was collected from the 3 to 5 feet bgs soil sampling interval further reduces concern for ecological exposure, as soil 3 feet below the surface is unlikely to be regularly encountered by most environmental receptors.

4.4.3 SLERA Conclusions

No COPECs are recommended for further evaluation at CY1, as the potential for adverse effects to populations of ecological receptors exposed to chemicals in soil at the CY1 is expected to be negligible. Therefore, no further action for the protection of ecological receptors is considered necessary.

5.0 Ash Pit No. 3

This chapter provides a summary of the sampling, analyses, results, and evaluation of the environmental media associated with AP3 (i.e., soil, overburden/shale groundwater, surface water, and sediment) that have been presented in the AP3 SCR (Appendices A and G), BHHRA (Appendix H), and SLERA (Appendix I). The reference for each of these documents is provided below:

- Shaw Environmental, Inc. (Shaw), 2012a, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013d, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment, FUDS Project No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

- Shaw Environmental Shaw Environmental & Infrastructure, Inc. (Shaw), 2012b, ***Final, Screening Level Ecological Risk Assessment, Ash Pit No. 3, Plum Brook Ordnance Works, Sandusky, Ohio,*** January.

In addition, results of the previous initial SI of AP3 (USACE, 2000b) are briefly summarized in Section 5.1. Identification of the samples and the recommendations from the SI present a context for the performance of the RI and for some of the specific sampling locations and analyses performed in the RI.

Please note that this chapter provides no data or other information that has not been previously presented in the AP3 SCRs, BHHRA, or SLERA (Appendices A, G, H, and I).

5.1 Previous Investigation and Evaluation

Prior to the RI, the following analytical samples were collected in 1999 as part of the SI for AP3 (USACE, 2000b):

- Four surface water samples (includes one QC field duplicate sample)
- Three sediment samples (includes one QA field split sample).

Two of the locations sampled collocated surface water and sediment sampling while the third location involved only surface water sampling. Surface water and sediment samples were analyzed for SVOCs and RCRA metals.

SVOCs were not detected in any of the surface water or sediment samples. No metals were detected above PRG screening levels in any of the surface water samples. A total of 15 metals were detected in the sediment samples, one exceeding the PRG screening limit. Arsenic was detected above the PRG in each of the three samples, exceeding the 0.38 ppm PRG, with concentrations ranging from a low of 3.6 ppm to a high of 5.9 ppm. Based on the arsenic concentration exceeding the PRG sediment screening level, the SI recommended further investigation of AP3 (USACE, 2000b). This RI report addresses the concerns raised by the SI evaluation. The SI results are summarized in the SCR (Appendix A and G) and were further evaluated in the BHHRA (Appendix H) and SLERA (Appendix I) together with the RI analytical results.

5.2 Site Characterization and Evaluation

This section summarizes the RI sampling of environmental media at AP1, the analytical results, and an evaluation of these results. Additional details are provided in the SCRs (Appendices A and G).

5.2.1 Samples and Analyses

The RI samples were collected consistent with the sitewide QAPP (Shaw, 2008b) and work plan for AP3 (Shaw, 2009a), although the investigative approach was modified to prevent potential disturbances to nearby nesting eagles. Soil, groundwater, surface water, and sediment sampling locations are shown on Figure 5-1.

Surface and subsurface soil samples were collected as part of the RI from eight borings. Soil samples were collected from August 19 through August 21, 2009 using a hand auger. Generally, surface soil is defined as samples collected from within the interval of 0 to 1 foot bgs, and subsurface soil is defined as samples collected from depths greater than 1 foot bgs per the RI work plan (Shaw, 2009a). A total of 20 soil samples, including 2 QA field split samples and 2 QC field duplicate samples, were collected; typically, 2 samples per borehole (1 from the ash layer, if encountered, and 1 from the clay layer below the ash). Total borehole depth was determined by the top of a clay layer located below the ash (Shaw, 2012a).

Three surface water and three sediment samples were collected from AP3 in May 2009. One surface water and one sediment sample were collected near the former ash slurry discharge line,

and two other collocated samples were collected from the drainage ditch exiting AP3 located on the southwest side. All three collocated surface water/sediment samples were collected near the 1999 SI sample locations (Shaw 2012a).

Because of the nesting eagles, the planned temporary groundwater piezometers could not be installed. However, three overburden/shale groundwater monitoring wells (AP3-MW01, AP3-MW02, and AP3-MW03) could be installed in interpreted upgradient, source area, and downgradient locations based upon groundwater data from the adjacent project site WWTP3, located immediately north of AP3. These overburden/shale groundwater wells were installed in August 2011 during the non-nesting time period that would have the least impact on the bald eagles (i.e., August through December). The shallow monitoring well borings and wells were drilled and installed using a direct-push rig. Limestone bedrock monitoring wells were not installed because a larger, potentially more disruptive drill rig would have been required (Shaw, 2013c).

The following list summarizes the samples and analyses collected for the RI:

- ***Surface Soil*** – Ten samples, including one QC field duplicate sample and one QA field split sample, were analyzed for nitroaromatics, SVOCs, TAL metals, and PCBs, and one sample was analyzed for TOC.

- ***Subsurface Soil*** - Ten samples, including one QC field duplicate sample and one QA field split sample, from within an overall depth interval between 0.8 to 5 feet were analyzed for nitroaromatics, TAL metals, PCBs, and SVOCs.

- ***Surface Water*** – Three samples were collected from the unnamed tributary located west of AP3. Samples were analyzed for nitroaromatics only and water quality readings were recorded.

- ***Sediment*** – Collocated with surface water samples, three sediment samples were collected from the unnamed tributary located west of AP3. Sediment sample AP3-SD01 was analyzed for nitroaromatics, SVOCs, PCBs, metals, and TOC and sediment samples AP3-SD02 and AP3-SD03 were analyzed for only nitroaromatics and PCBs.

- ***Overburden/Shale Monitoring Wells*** – A total of six groundwater samples, three in the wet season and three in the dry season, were collected from AP3 wells. Samples in the wet season (December 2011) were collected using the low-flow sampling methodology and analyzed for nitroaromatics, TAL metals (filtered and unfiltered), SVOCs, VOCs, and general chemistry parameters; field tests were also conducted. Since January through July is the nesting time for the bald eagles and minimal disturbance was necessary, groundwater samples in May 2012 were

collected using a passive, no-purge sample collection tool called a Snap-Sampler™. Based upon a low volume of groundwater that could be collected, samples were analyzed for only nitroaromatics, VOCs, and TAL metals.

All analytical data from these samples were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the EPA *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b), the QAPP (Shaw, 2008b), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project DQOs. The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to National Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993). Additional information on data evaluation, data validation, and data quality are provided in the SCR and information therein (Appendix A and G).

5.2.2 Physical Characteristics

5.2.2.1 Local Soils

No fill material, or soil purposely placed for leveling and landscape appearance, was believed to have been encountered during hand augering of the eight soil borings. Ash was encountered in six of the eight borings at an average depth of 0.4 foot bgs. Material above the ash was either an organic matter (roots, decaying leaves, and sticks) or natural soil (black, silty sand) which was washed into place. The ash layer encountered averaged approximately 1 foot in thickness and typically consisted of a black, fine-to-medium grain, sand-ash mixture. Below the ash layer, a gray, mottled, silty clay or clayey silt was encountered. The depth of the soil borings hand augered ranged from 1.5 to 5 feet bgs. Bedrock was not encountered in any of the borings drilled to collect soil samples (Shaw, 2012a).

Subsurface soils at a depth of 5 to 16 feet, as encountered by overburden/shale boring AP3-MW01, were observed to be very dark brown to grayish-brown silt. Below 16 feet, the soil consisted of dark gray clay until bedrock at a total depth of 29 feet (Shaw, 2013c).

5.2.2.2 Local Geology

Only one boring drilled at AP3 (AP3-MW01) was advanced until refusal was encountered. Refusal was detected at a depth of 29 feet bgs (elevation of 609.5 feet amsl). Based on the site-wide geological map, the Devonian age Plum Brook Shale member of the Olentangy Shale formation is the bedrock below AP3, but no refusal material was recovered to confirm the presence of this shale (Shaw, 2013c).

5.2.2.3 Local Hydrogeology

During August 2011 (dry season) groundwater monitoring well installation, overburden groundwater at AP3 was encountered in all three of the well borings at depths ranging from 6.2 feet bgs (AP3-MW02 and AP3-MW03) to 7.5 feet bgs (AP3-MW01). Overburden groundwater flow in the general vicinity of AP 3 varies. As can be seen on Figure 5-2, generated in October 2011, groundwater flow is generally to the northwest during periods of low recharge and lower groundwater elevations. However, when groundwater elevations reach an elevation of approximately 634 feet amsl below the central portion of the ash pit, groundwater begins to discharge into the ash pit, which in turn is drained by a small ditch exiting the west side of ash pit. This groundwater discharge results in a localized reversal of groundwater flow to the southeast in well AP3-MW03 (Figure 5-3) (Shaw, 2013c).

5.2.2.4 Local Surface Water

Surface water from AP3 flows distinctly west via a drainage ditch beginning on the southwest corner of AP3 (Figure 5-1) (Shaw, 2012a). The unnamed drainage ditch eventually discharges into Pipe Creek. Surface water tends to pool in localized shallow depressions within AP3. Based on reports from site personnel, AP3 is often dry, but water pools in the lowest portion in the southwest corner of the depression after periods of rainfall and is retained for some period of time.

5.2.3 Summary of Analytical Results

The analytical results of the RI samples, described in Section 5.2.1, are summarized in this section. As part of this evaluation, analytes detected in the respective environmental media were compared to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in Tables 5-1 through 5-3. Because AP3 surface samples were analyzed only for nitroaromatics and no nitroaromatics were detected, a table for AP3 surface water is not present. The derivation of RBSCs and BSCs are described in the AP3 BHHRA (Appendix H). RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks was performed in the BHHRA.

Concentrations in individual samples that exceed the respective BSCs are identified by bold text in the Chapter 5.0 result Tables 5-1 through 5-3. Sampling locations where RBSCs and/or BSC were exceeded are shown on Figures 5-4 through 5-6.

The evaluation of the analytical results of the samples and analyses, as presented in the SCRs, are summarized below for each medium.

Surface and Subsurface Soil Summary. The findings from AP3 surface and subsurface soil are summarized as follows:

- One nitroaromatic, 2,6-DNT, was detected in four surface soil samples and one subsurface soil sample, but all detections were below the 0.71 ppm RBSC.
- One PCB analyte (Aroclor 1260) was detected in two surface soil samples, but both detections were below the 0.22 ppm RBSC.
- No PCBs were detected in the subsurface soil samples.
- The SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were detected above RBSCs in the surface soil sample from boring AP3-SB01.
- SVOCs were not detected in any subsurface soil sample.
- Arsenic was the only metal to exceed both the RBSC and BSC in surface soil. No metals were detected in subsurface soil at concentrations exceeding both RBSCs and BSCs.

Surface Water Summary. Three surface water samples were collected from AP3, one near the former ash slurry discharge line and two from the drainage ditch exiting AP3. The findings from AP3 surface water are summarized as follows:

- No nitroaromatics were detected in any of the surface water samples.

Sediment Summary. Three sediment samples were collocated with the surface water samples in AP3, one near the former ash slurry discharge line and the other two from the drainage ditch exiting AP3. The findings from AP3 sediment are summarized as follows:

- No nitroaromatics or PCBs were detected in any sediment samples.

- Two SVOC polycyclic aromatic hydrocarbons (PAH), benzo(a)pyrene and benzo(b)floranthene, were detected above the RBSCs in the sediment sample AP3-SD01 (no PAHs were detected in the 1999 sediment samples).

- Only arsenic and chromium were detected above the RBSCs in the 2009 sediment samples.

Monitoring Well Overburden/Shale Groundwater Sample Summary. Five groundwater samples, including one QC field duplicate and one QA field split sample, were collected in December 2011 from the three overburden/shale monitoring wells at AP3 using the low-flow sampling methodology. To prevent disturbance to nearby nesting eagles, three groundwater samples were collected in May 2012 from AP3 wells using the passive, no purge Snap-Sampler collection tool. Groundwater samples collected during December 2011 were analyzed for VOCs, SVOCs, nitroaromatics, metals (filtered and unfiltered), and water quality parameters. Due to groundwater volume collection restrictions using the Snap-Sampler during May 2012, groundwater samples could only be analyzed for VOCs, nitroaromatics, and filtered metals. The findings are summarized as follows:

- No VOCs or nitroaromatics were detected above RBSC levels in any of the samples.

- Arsenic, iron, and manganese exceeded both the RBSCs and BSCs in upgradient well AP3-MW01. These exceedances are due to a localized change in groundwater geochemistry, possibly from leaching of organic matter from the CY3 area.

5.3 Baseline Human Health Risk Assessment

This section provides a summary of the AP3 BHHRA report (Shaw, 2013d). It is important to note that this site-specific risk assessment, including the evaluation of future land use and groundwater use, was performed to satisfy administrative requirements. All data and other information presented in this section have been previously presented in the SCR (Appendices A and G) and/or BHHRA (Appendix H) reports. This BHHRA is consistent with EPA guidance and with the procedures established in the BHHRA for TNTA and TNTC soil (IT, 2001c), the BHHRA for groundwater at PBOW (Shaw, 2006), and the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009a).

5.3.1 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC

screening includes a risk-based screen which also considers status as a human nutrient, a frequency-of-detection evaluation, and a background screen (Appendix H).

The COPCs for each of the AP3 media are identified as follows:

- ***Surface Soil*** – Arsenic, thallium, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene
- ***Subsurface Soil*** – Thallium
- ***Total Soil*** – Arsenic, thallium, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene
- ***Overburden/shale Groundwater*** – Arsenic, chromium, cobalt, iron, manganese, and sulfate
- ***Sediment*** – Arsenic, chromium, benzo(a)pyrene, and benzo(b)fluoranthene
- ***Surface Water*** – None.

A summary of the COPC screening process and identification is shown in Tables 5-4 through 5-9 for surface soil, subsurface soil, total soil, overburden/shale groundwater, sediment, and surface water, respectively. As discussed in Appendix H, the total soil COPCs include all surface soil and subsurface soil COPCs.

5.3.2 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989). The AP3 BHHRA characterizes potential exposure to COPCs in AP3 environmental media as portrayed by the CSEM (Figure 3-10), which includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways. The receptors and pathways reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by D&M (1997) and the site-wide groundwater investigation (IT, 1997b).

No current or future exposure to off-site residents is evaluated because off-site residents are serviced by municipal water from surface water sources. Although there are numerous private groundwater wells in the vicinity, including several within 1 mile of the facility boundary, none of these are used as a potable source.

As described in Section 2.4.1, the groundwater underlying AP3 provides low yields and is of low quality. However, the OEPA has maintained that an assumption of potable use should initially be made under baseline conditions where no prior use restrictions are in place. Therefore, the development of groundwater for hypothetical on-site residential and on-site worker use as tap water was evaluated for purposes of this BHHRA at the request of OEPA (also refer to Section 3.3.2) .

Exposure associated with the COPCs was evaluated using the following receptors. Each medium that is quantitatively evaluated for each receptor (provided that COPCs are identified for that medium) is listed in parentheses:

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil and overburden/shale groundwater)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only], and overburden/shale groundwater)
- Current/future construction worker (total soil, surface water, and sediment)
- Future resident (total soil, surface water, sediment, and overburden/shale groundwater,)
- Hunter (surface soil, including venison pathway)
- Hunter's child (surface soil [venison pathway only]).

The resident was evaluated for noncancer hazards separately for the young child (ages 1 through 6 years) and adult life stages, and the noncancer hazard results are presented separately for the child and adult residents. Cancer risk results for the child and adult resident were evaluated based on 30-year combined child/adult exposure duration and are presented as combined child/adult cancer risks.

The equations for the calculations of intake values for each exposure pathway, exposure assumptions, and the calculation of EPCs of COPCs for modeled pathways (e.g., venison, airborne concentrations) are presented in the BHHRA (Appendix H).

5.3.3 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of COPCs.

Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects. The equations and input values used to calculate cancer risks and noncancer hazards are included in Appendix H.

5.3.3.1 Cancer Risk

The ILCR is estimated as the probability of an individual developing cancer over a lifetime. Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); this range is referred to as the NCP risk management range. A target cancer risk goal of 1E-5 was selected by the PBOW Project Delivery Team as a basis to consider remedial action. Use of this 1E-5 goal represents a departure from the Army's practice of generally using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations.

5.3.3.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with a chemical-specific chronic RfD as described in the BHHRA (Appendix H). An HQ of 1 indicates that the estimated intake equals the RfD. If the HQ is greater than 1, there may be concern for potential adverse health effects. In the case of simultaneous exposure of a receptor to multiple chemicals, an HI is calculated as the sum of the HQs.

A total HI is calculated as the sum of all HI values, including all media and all COPCs, for a given receptor. Calculating a total HI as the sum of HQ values is based on the assumption that the potential for noncancer effects is additive. EPA (1989), however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism. Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ, as described in Appendix H.

5.3.3.3 Risk Characterization Results

Cancer and noncancer risk characterization results were evaluated in the BHHRA for each AP3 environmental medium and each receptor scenario using the methods summarized in Sections 5.3.3.1 and 5.3.3.2 and described in Appendix H.

The cancer risks and noncancer hazards are presented for each receptor exposed to AP3 are shown in Table 5-10.

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk criteria (ILCR greater than 1E-5) are shown as bold and exceedances of the noncancer hazard criterion (HI greater than 1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics.

- Current groundskeeper: ILCR = 1E-6; HI = 0.04
- Future groundskeeper – all pathways including overburden/shale groundwater: **ILCR = 4E-5**; HI = 0.7
- Future groundskeeper – all pathways excluding groundwater: ILCR = 1E-6; HI = 0.02
- Future indoor worker – all pathways including overburden/shale groundwater: ILCR = **4E-5**; HI = 0.6
- Future indoor worker – all pathways excluding groundwater: ILCR = 3E-7; HI = 0.02
- Current/future construction worker: ILCR = 5E-8; HI = 0.1
- Hypothetical future resident – all pathways including overburden/shale groundwater: ***ILCR = 2E-4***; ***child HI = 5; adult HI = 2***
- Hypothetical future resident – all pathways excluding groundwater: ILCR = **5E-5**; child HI = 0.3; adult HI = 0.03
- Future hunter: ILCR = 7E-8; HI = 0.002
- Future hunter's child: HI = 0.000001; none of the carcinogenic COPCs are bioaccumulative; cancer risks are assumed to be de minimis.

The HI values shown on Table 5-10 do not include the contributions of arsenic in soils that were quantified in the BHHRA because further evaluation in the BHHRA uncertainty analysis (Appendix H) identified the concentrations of arsenic present in soils as unrelated to former site operations.

5.3.4 BHHRA Conclusions

The ILCR values for each of the AP3 exposure scenarios are within (or less than) the NCP risk management range, except that for the hypothetical future resident, who is assumed to use AP3 overburden/shale groundwater as a potable source. The ILCR associated with the groundwater pathway is entirely attributable to arsenic (ILCR=2×10^{-4}), which appears to be unrelated to former PBOW activities. The ILCR values for the future groundskeeper and indoor worker assumed to use groundwater as a potable source exceed the PBOW cancer risk goal of 1E-5, but

not the NCP risk management range. The ILCR value for each of the AP3 exposure scenarios is within (or less than) the NCP risk management range and the PBOW cancer risk goal of 1E-5, if exposure to groundwater is excluded from the evaluations. As discussed, overburden/shale groundwater unit underlying AP3 yields an inadequate volume of water for potable use; thus, the assumption of potable use is regarded as implausible.

The HI values of each of the AP3 receptors, except the future adult (HI=2) and child resident (HI=5) assumed to use groundwater, meet the noncancer target HI of 1. The HI values associated with groundwater exposure alone for the resident exceeded the target HI value for both the adult (HI=2 [1.6 prior to rounding]) and child resident (HI=4). These hazards were found to be nearly entirely associated with the presence of arsenic (HQ=1.7 [child] and HQ=0.7 [adult]) and manganese (HQ=1.6 [child] and HQ=0.7 [adult]). The elevated concentrations of these two inorganics appear to be unrelated to former PBOW activities. The sources of the elevated concentrations of these inorganics in groundwater are evidently unrelated to former site operations, and they appear to be naturally occurring. Moreover, as discussed, potable use of overburden/shale groundwater is regarded as implausible at AP3 because of insufficient water yield. Therefore, the HI values for AP3 receptors under plausible exposure pathways meet the HI criterion of 1.

5.4 Screening-Level Ecological Risk Assessment

This section provides a summary of the SLERA report for AP3 (Shaw, 2012b), which is included as Appendix I. It is important to note that this SLERA was performed to satisfy administrative requirements including those described by FUDS regulations (USACE, 2004). All data and other information presented herein has been previously presented in the full AP3 SLERA and/or SCR reports (Appendices A and G).

The SLERA was performed to evaluate and provide an estimate of current and future ecological hazard associated with exposure to potential releases to soil, surface water, and sediment from AP3. This summary provides an ecological site description, identifies COPECs, identifies ecological receptors, characterizes exposure, characterizes ecological risks, and presents the conclusions of the SLERA.

The AP3 SLERA is consistent with EPA guidance and with the procedures established in previous risk assessments performed at PBOW (e.g., the SLERA for TNTA and TNTC [IT, 2001b]) as well as the AP3 SLERA work plan (Shaw, 2009b).

5.4.1 Ecological Site Description

This section summarizes the general discussion of site background and the area of concern, surface water resources, wetlands, and vegetative communities; a species inventory; and a discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities discussed in Sections 5.4.1.1 and 5.4.1.2. Additional ecological site description is provided in Appendix I.

5.4.1.1 Site Background

PBOW is part of the Lake Plains region. Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (ODNR, 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within the greater context of primarily agricultural land in north-central Ohio.

AP3 is approximately 1.5 acres in size and is located in a flat circular depression west of Ransom Road. Water discharges from this depression via an east-west-trending drainage ditch that eventually discharges into Pipe Creek to the west.

5.4.1.2 Site Reconnaissance

Ecologists performed site visits to AP3 on October 16, 2008 and April 29 and June 2, 2009. These visits were performed at different times of year to identify early- and late-blooming plant species (especially threatened and endangered) and to identify migrating and nesting bird species. These site visits were also used to compile lists of other fauna observed at the site. No federally or state-listed species were observed. A full species list is presented in the SLERA (Appendix I).

Prior to arrival at PBOW, site personnel obtained maps and other relevant site information and determined the locations of potential ecological units such as streams, creeks, ponds, grasslands, forest, and wetlands on or near the site. The locations of known or potential contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Reconnaissance personnel used the site visit to evaluate the site for more subtle clues of potential effects from contaminant release. Information obtained during the reconnaissance trips was used to select representative

receptors, refine exposure scenarios for the risk assessment, and identify protected species or habitats of special concern in the study area.

5.4.1.3 Surface Water

Based on reports from site personnel, AP3 is often dry, but water pools in the lowest portion in the southwest corner of the depression after periods of rainfall and is retained for some period of time. Standing water was present in this area during one site visit (Photo 4 on Figure 2-1 of Appendix I) and was present throughout the entire depression area during the other two site visits (Photos 6 and 7 on Figure 2-1 of Appendix I). It should be noted that all three site reconnaissance visits were performed within several days of heavy rain. AP3 drains to a drainage ditch that exits the site to the west. Water was not observed in the drainage ditch during the October 2008 site visit (Photo 3 on Figure 2-1 of Appendix I).

5.4.1.4 Wetlands

According to the NWI maps for the area (U.S. Fish and Wildlife Service, 2013), AP3 is identified as a freshwater pond wetland (wetland classification code PUBG, i.e., a palustrine system with an unconsolidated bottom, intermittently exposed). It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes (such as those present at PBOW) because minor depressions often contain isolated wetlands not easily identified through interpretation of aerial photographs (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). It should also be noted that the NWI map classification may have been based on previous anthropogenic conditions.

Subsequent to completion of the RI, a wetland delineation of the NASA Plum Brook Station, including AP3, was performed for NASA and the results were provided in a delineation report (EnviroScience, Inc., 2012). Based on this report, a wetland area exists within the former ash impoundment area in the AP3 study area, where water may pond after precipitation events. Wetlands also exist along part of the drainage ditch that extends from the former ash pit westward (Figure 3-1). The findings of the EnviroScience, Inc. (2012) wetland report have not been verified by the USACE.

5.4.1.5 Vegetative Communities

Vegetative communities at AP3 were classified during the site reconnaissance trips (Figure 2-2 of Appendix I). AP3 contains a roughly circular marsh in the former ash pit depression surrounded by upland old field and successional woods, where wetland vegetation is found. Successional woods are found over most of the remainder of this site. The woods contain young

to moderate-aged trees, saplings, and shrubs, with a sparse to moderate herbaceous layer. A small patch of upland old field occurs in the southeast corner of the site.

Based on site reconnaissance information, AP3 represents a relatively small undisturbed parcel of shrub-thicket habitat that is capable of supporting ecological receptors. Vegetative stress attributable to chemicals was not observed at AP3, and there was no evidence that significant ecological threats exist at the site.

5.4.1.6 Species Inventory

A total of 91 plant species were documented at AP3 during the spring and fall vegetation surveys. Signs of 4 of the 43 species of mammals that may be found in the region based on species range maps were observed at AP3 during site visits including opossum, cottontail rabbit, raccoon, and white-tailed deer. It is likely that other species are present but were not observed due to the short duration of the field visits.

Twenty bird species were documented at AP3 during the site visits performed by Shaw, and 14 of these were identified as being present during the breeding season. An active bald eagle (*Haliaeetus leucocephalus*) nest was present at AP3, and an adult eagle was observed during the spring site reconnaissance. The bald eagle had been a state-threatened species during most of the RI field activities, but it was delisted in 2012.

No amphibian or reptile species were observed during the site reconnaissance. Aquatic habitat is limited at AP3, and no fish were observed during AP3 site reconnaissance.

5.4.2 Identification of Chemicals of Potential Ecological Concern

A screening process was performed on the analytical data from the RI and SI to identify COPECs that may pose a threat to ecological receptors. These data include all soil samples collected to a depth of 6 feet, surface water samples, and sediment samples. Groundwater was excluded because exposure to this AP3 medium is considered to be an incomplete pathway for ecological receptors. Sample locations are presented on Figure 5-1.

The COPEC selection process was performed to develop a subset of chemicals detected at the site that are not naturally occurring or associated with non-site-related sources. These chemicals may also be present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. This selection process and the screening values used for COPEC selection are described in the SLERA (Appendix I). The results of the COPEC screening are presented in Tables 5-11 through 5-13 for soil, surface water, and sediment at AP1. Three chemicals were

identified as COPECs in soil, one was selected in surface water, and four were selected in sediment at AP3.

Chemicals identified as COPECs were quantitatively evaluated in the SLERA predictive evaluation, which is summarized in Sections 3.4.3 through 3.4.6, where chemical-specific data were available.

5.4.3 Selection of Ecological Receptors

Ecological assessment receptors were selected in the SLERA to focus the exposure characterization on species, groups of species, or functional groups that are directly related to the following assessment endpoints: the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, and carnivorous birds.

As part of this receptor selection process, site biota were organized into major functional groups. For terrestrial communities, the major groups are plants and wildlife, including terrestrial invertebrates, mammals, and birds.

Seven representative terrestrial receptor species that are expected or possible in the area of AP3 (based on the ecological description of the site presented in Section 5.1) were selected as indicator species for the potential effects of COPECs. These indicator species represent two classes of vertebrate wildlife (mammals and birds); include a range of both body size and food habits; and include herbivores, omnivores, and carnivores. The seven terrestrial species selected include the deer mouse (small omnivorous mammal), short-tailed shrew (small insectivorous mammal), Eastern cottontail rabbit (medium-sized terrestrial herbivorous mammal), marsh wren (small insectivorous bird), raccoon (medium-sized omnivorous mammal), white-tailed deer (large herbivorous mammal), and red-tailed hawk (large carnivorous bird).

Exposure to aquatic organisms in the ditches and wet areas is assumed to occur via direct exposure to contaminants in the water column and via prey exposed to contaminants in surface water and sediment. Potential uptake through the aquatic food chain is evaluated for the raccoon (also considered as a terrestrial receptor) and muskrat (medium-sized aquatic herbivorous mammal).

A terrestrial food web is presented on Figure 3-11, and an aquatic food web is presented on Figure 3-12. Many of the species evaluated, particularly the deer mouse, cottontail rabbit, short-tailed shrew, and marsh wren, have limited home ranges that make them particularly vulnerable

to exposure from site contaminants. Further discussion of the selection of ecological receptors is provided in Appendix I.

5.4.4 Exposure Characterization

Ecological routes of exposure for biota may be direct (bioconcentration) or through the food web via the consumption of contaminated organisms (biomagnification). Exposure to soil, surface water, and sediment was evaluated for the pertinent representative terrestrial and aquatic assessment receptors, as described in Appendix I. Direct exposure routes include dermal contact, absorption, inhalation, and ingestion. Further discussion of exposure routes is provided in Appendix I.

Daily doses of COPECs for vertebrate receptors were calculated using standard exposure algorithms. These algorithms incorporate species-specific natural history parameters (e.g., feeding rates, water ingestion rates, and dietary composition) as well as site-specific area use factors. These algorithms are presented and described in the SLERA (Appendix I).

5.4.5 Risk Characterization

Food-chain modeling was used to estimate exposure rates for the representative assessment receptors. These exposure rates were compared with TRVs to calculate EHQs for ecological receptors (Wentsel et al., 1996). Only conservative TRVs based on NOAELs were used in the food chain model. EHQs are calculated by summing intake doses across all exposure pathways for each chemical for a given receptor and dividing by the TRV. EHQs less than or equal to 1 represent no probable hazard. Although OEPA considers all EHQs above 1 to be potentially significant, the following uncertainties regarding EHQ interpretation are noted:

- EHQs are not measures of risk.
- EHQs are not population based.
- EHQs are not linearly scaled.
- EHQs are often produced that are unrealistically high and toxicologically impossible (e.g., estimated EHQs greater than 1,000).
- Trace soil concentrations of inorganic chemicals (including concentrations well below background levels) can lead to EHQ threshold exceedances.

The following interpretation of EHQ ranges from Wentsel et al. (1996) takes into consideration the uncertainties inherent in EHQs and provides a basis for possible recommendations:

- EHQs from 1 to less than 10 represent a low potential for environmental effects.
- EHQs from 10 to less than 100 represent a significant potential that effects could result from greater exposure.
- EHQs greater than 100 represent the highest potential for expected effects.

Therefore, it should be understood that EHQs greater than 1 do not mean that adverse ecological effects are occurring at the site or may occur in the future.

Table 5-14 summarizes the NOAEL-based EHQs for the seven evaluated terrestrial assessment receptors and two aquatic receptors, as presented in Section 5.3 of the SLERA (Appendix I). Note that the raccoon includes both terrestrial and aquatic components.

5.4.6 SLERA Conclusions

Based on the assessment receptor EHQ results, the potential for adverse ecological effects is regarded as low. Only two receptors (mouse and shrew) had EHQs that exceeded a value of 1; both of these values are associated with thallium using the more stringent NOAEL toxicity value. If the less conservative, lowest-observed-adverse-effect-level toxicity value is used, all of the EHQ values are less than 1, including those of thallium. Also, the relatively small size of the AP3 study area (less than 2 acres) likely precludes the possibility of ecological population-level effects. Based on these findings, the potential for adverse ecological effects is regarded as extremely low for AP3.

No further evaluation of chemicals in AP3 environmental media is recommended for ecological purposes alone.

6.0 Coal Yard No. 3

This chapter provides a summary of the sampling, analyses, results, and evaluation of the environmental media associated with CY3 (i.e., surface and subsurface soil) that have been presented in the SCR (Appendix G), BHHRA (Appendix J), and SLERA (Appendix K) addenda for CY3. The reference for each of these documents is provided below:

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013c, ***Final, Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 3 Soil and Ash Pit No. 3 Groundwater, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** February.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013e, ***Final, Ash Pit No. 3, Baseline Human Health Risk Assessment Addendum For Coal Yard No. 3, FUDS No. G05OH001821, Former Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

- Shaw Environmental & Infrastructure, Inc. (Shaw), 2013f, ***Final, Ash Pit No. 3, Screening Level Ecological Risk Assessment For Coal Yard No. 3, FUDS Project No. G05OH001821, Plum Brook Ordnance Works, Sandusky, Ohio,*** October.

Please note that this chapter provides no data or other information that has not been previously presented in the SCR, BHHRA, or SLERA Addenda for CY3 (Appendices G, J, and K, respectively).

6.1 Previous Investigation and Evaluation

No previous environmental investigations of CY3 have been conducted.

6.2 Site Characterization and Evaluation

This section summarizes the RI sampling of surface soil and subsurface soil at CY3, the analytical results, and an evaluation of these results that are presented in the SCR addendum for CY3, referred to hereinafter as the "CY3 SCR." Additional details are provided in the CY3 SCR (Appendix G).

6.2.1 Samples and Analyses

The RI samples were collected consistent with the site-specific QAPP (Shaw, 2008b) and site-specific sampling and analysis plan (Shaw, 2011e). Soil sampling locations are shown on Figure 6-1.

Four surface soil samples and 10 subsurface soil samples, including 1 QA field split sample and 1 QC field duplicate sample, were collected from four soil borings drilled at CY3. Soil samples were collected from approximate depths of 0 to 1, 3 to 5, and 8 to 10 feet bgs. Generally, surface soil is defined as samples collected from an interval beginning at 0 to 1 foot bgs and subsurface soil is defined as samples collected from depth intervals starting at greater than 1 foot bgs. The surface soil sampling interval was adjusted so that the surface sample interval was based on the interpreted native surface soil prior to construction of PBOW in 1941. This interpretation was made in the field based on boring log results and site knowledge of native soils. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. Also, surface soil samples and those collected from a depth interval of 3 to 5 feet bgs were analyzed for PCBs.

The following list summarizes the samples and analyses collected for the RI:

- ***Surface Soil*** – Four samples were analyzed for nitroaromatics, SVOCs, TAL metals, and PCBs, and one sample was analyzed for TOC.
- ***Subsurface Soil*** – Six samples, including one QC field duplicate sample and one QA field split sample, from within an overall depth interval of 3 to 5 feet were analyzed for nitroaromatics, SVOCs, TAL metals, and PCBs. Four samples from within a depth interval of 8 to 10 feet were analyzed for nitroaromatics, TAL metals, and SVOCs.

All analytical data from these samples were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the EPA *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b), the QAPP (Shaw, 2008b), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project DQOs. The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to National Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993). Additional information on data evaluation, data validation, and data quality are provided in the CY3 SCR and information attached therein (Appendix G).

6.2.2 Physical Characteristics

Descriptions and information regarding the local geography, topography, surface drainage, local geology and hydrogeology characteristics, and precipitation influence effects on local water

levels has been summarized for AP3 in Section 5.2. This information is also applicable or assumed to be applicable for the adjacent CY3. Please note that no surface water bodies or drainage features were identified at CY3. A description of the local soils is the only information in this section that is specific to CY3.

CY3 Local Soils. A soil that is interpreted to be possible fill material or disturbed soil was encountered in soil borings CY3-SB01 and CY3-SB02. The surface soil is composed of dark brown and gray silt, coal, and sand overlying a silt, sand, and gravel mixture to depths of 1.2 feet bgs (CY3-SB01) and 1.5 feet bgs (CY3-SB02). The apparent fill or disturbed surface soil at these two locations is suspected to be a result of grading and mixing of the coal and surface soil. In CY3-SB03, no coal was encountered and the surface soil consists of silt with sand and clay. In boring CY3-SB04, the surface soil was dark grayish-brown silt with clay. Figure 6-1 shows a CY3 site map with soil boring locations (Shaw, 2013c).

Below the possible fill and coal material at locations CY3-SB01 and CY3-SB02 and below surface soil in borings CY3-SB03 and CY3-SB04, native material consisted of glacial till, glacial outwash, or possibly a glacial lacustrine (lake) deposit. In general, the soil borings encountered silt with varying amounts of clay and/or sand that was medium-stiff in consistency with varying brownish hues to boring termination. In CY3-SB04, grayish-brown clay was encountered at a depth of 9 feet bgs (Shaw, 2013c).

The upgradient monitoring well for AP3 (AP3-MW01) was completed in the western portion of CY3. The subsurface soils (3 to 10 feet bgs) of boring CY3-SB04 are similar to the subsurface soils of AP3-MW01 which were found to be very dark brown to grayish-brown silt (Shaw, 2013c).

6.2.3 Summary of Analytical Results

The analytical results of the CY3 RI samples described in Section 6.2.1 are summarized in this section. As part of this evaluation, analytes detected in the respective environmental media were compared to RBSCs and BSCs as points of reference only. Concentrations of soil analytes that exceed the RBSCs are highlighted in the associated table (Table 6-1). The derivation of RBSCs and BSCs are described in the CY3 BHHRA (Appendix J). RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks was performed in the CY3 BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified by bold text in Table 6-1. Sampling locations where RBSCs and/or BSC were exceeded in soil surface and subsurface soil samples are shown on Figure 6-2.

The evaluation of the analytical results of the samples and analyses, as presented in the SCR, are summarized below.

Surface and Subsurface Soil Summary. The findings from CY3 surface and subsurface soil are summarized as follows:

Surface Soil

- No nitroaromatics or PCBs were detected in surface soil samples.
- Five SVOCs were detected above RBSC levels in two surface soil borings (CY3-SB01 and CY3-SB02) and one was above the RBSC in boring CY3-SB03.
- No TAL metals were detected above both the RBSC and BSC screening values in any surface soil samples.

Subsurface Soil

- No nitroaromatics or PCBs were detected in subsurface soil samples.
- No SVOCs were detected in subsurface soil samples.
- No TAL metals were detected above both the RBSC and BSC screening values in any subsurface soil samples.

6.3 Baseline Human Health Risk Assessment

This section provides a summary of the AP3 BHHRA addendum for CY3 report (Shaw, 2013e), which is included as Appendix J and referred to hereinafter as the "CY3 BHHRA." It is important to note that this site-specific risk assessment, including the evaluation of future land use, was performed to satisfy administrative requirements. All data and other information presented in this section have been previously presented in the full BHHRA and/or SCR (Appendix G) reports.

This BHHRA is consistent with EPA guidance and with the procedures established in the BHHRA for TNTA and TNTC soil (IT, 2001a), the BHHRA for groundwater at PBOW (Shaw, 2006) and the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009a).

Groundwater underlying CY3 was not specifically evaluated for human health risks in the CY3 BHHRA because the groundwater evaluated in the AP3 BHHRA is regarded as representative of CY3 as well.

6.3.1 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. The COPC screening includes a risk-based screen which also considers status as a human nutrient, a frequency-of-detection evaluation, and a background screen (Appendix J).

The COPCs for each of the CY3 media are identified as follows:

- ***Surface Soil*** – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.
- ***Subsurface Soil*** – None
- ***Total Soil*** – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene .

A summary of the COPC screening process and identification is shown for surface soil (Table 6-2) and subsurface soil (Table 6-3).Because no COPCs were identified for subsurface soil, the surface soil analytical results were used for total soil at CY3.

6.3.2 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989). The CY3 BHHRA characterizes potential exposure to COPCs in CY3 environmental media as portrayed by the CSEM (Figure 6-3), which includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways. The receptors and pathways reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by D&M (1997) and the sitewide groundwater investigation (IT, 1997b).

Exposure associated with the COPCs was evaluated using the following receptors. Each medium that is quantitatively evaluated for each receptor (provided that COPCs are identified for that medium) are listed in parentheses:

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil)
- Future indoor worker (surface soil and subsurface soil [inhalation pathway only])

- Current/future construction worker (total soil)
- Hypothetical future resident (total soil)
- Hunter (surface soil, including venison pathway)
- Hunter's child (surface soil [venison pathway only]).

The resident was evaluated for noncancer hazards separately for the young child (ages 1 through 6 years) and adult life stages, and the noncancer hazard results are presented separately for the child and adult residents. Cancer risk results for the child and adult resident were evaluated based on 30-year combined child/adult exposure duration and are presented as combined child/adult cancer risks.

The equations for the calculations of intake values for each exposure pathway, exposure assumptions, and the calculation of EPCs of COPCs for modeled pathways (e.g., venison, airborne concentrations) are presented in the BHHRA (Appendix J).

6.3.3 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of COPCs. Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects. The equations and input values used to calculate cancer risks and noncancer hazards are included in Appendix J.

6.3.3.1 Cancer Risk

The ILCR is estimated as the probability of an individual developing cancer over a lifetime. Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); this range is referred to as the NCP risk management range. A target cancer risk goal of 1E-5 was selected by the PBOW Project Delivery Team as a basis to consider remedial action. Use of this 1E-5 goal represents a departure from the Army's practice of generally using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations.

6.3.3.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with a chemical-specific chronic RfD as described in the BHHRA (Appendix J). Each of the CY3 COPCs is a PAH that was identified as a COPC based on carcinogenic effects. None of these COPCs have recognized RfDs. Therefore, a quantitative evaluation of noncancer effects associated with CY3 soil could not be performed.

6.3.3.3 Risk Characterization Results

Cancer risk characterization results were evaluated in the BHHRA for each CY3 environmental medium and each receptor scenario using the methods summarized in Sections 6.3.3.1 and 6.3.3.2 and described in Appendix J. The cancer risks are presented for each receptor exposed to CY3 soil in Table 6-4. The overall HI and ILCR values are summarized in the following bullets:

- Current groundskeeper: ILCR = 3E-6
- Future groundskeeper: ILCR = 3E-6
- Future indoor worker: ILCR = 8E-7
- Construction worker: ILCR = 1E-7
- Hypothetical future resident: ILCR = 9E-6
- Future hunter: ILCR = 2E-7
- Future hunter's child: None of the carcinogenic COPCs are bioaccumulative; cancer risks are assumed to be de minimis.

None of the COPCs have recognized noncancer effects. Therefore, the noncancer hazards of CY3 soil are regarded as negligible for all receptors.

6.3.3.4 BHHRA Conclusions

The BHHRA was conducted to evaluate cancer risks and noncancer hazards associated with CY3 surface soil and. It is noted that the BHHRA, including the evaluation of future uses and groundwater use, was conducted to meet administrative requirements, including FUDS regulations (USACE, 2004).

The ILCR values for each of the CY3 exposure scenarios are within (or less than) the NCP risk management range and the PBOW cancer risk goal of 1E-5. None of the COPCs have recognized noncancer effects. Therefore, the noncancer hazards associated with exposure to site-related chemicals in CY3 soil are regarded as negligible.

6.4 Screening-Level Ecological Risk Assessment

This section provides a summary of the SLERA report for CY3 (Shaw, 2013f), which is included as Appendix K. It is important to note that this SLERA was performed to satisfy administrative requirements including those described by FUDS regulations (USACE, 2004). All data and other information presented herein have been previously presented in the full CY3 SLERA and/or SCR reports (Appendix G).

The SLERA was performed to evaluate and provide an estimate of current and future ecological hazard associated with exposure to potential releases to soil, surface water, and sediment from the AP3 CY3. This summary provides an ecological site description, identifies COPECs, and presents the conclusions of the SLERA. The CY3 SLERA is consistent with EPA guidance and with the procedures established in previous risk assessments performed at PBOW (e.g., the SLERA for TNTA and TNTC [IT, 2001b]) as well as the AP1 SLERA work plan (Shaw, 2009b).

6.4.1 Ecological Site Description

Ecological characterization of the study area was based on a compilation of existing ecological information. Because CY3 is in such close proximity to AP3, a formal ecological reconnaissance was not performed for CY3. Rather, the habitat description, sensitive ecological resources, and faunal assemblages (including potential threatened and endangered species) described in the AP3 SLERA (Shaw, 2013e) were determined to also be relevant for the CY3 site. Also, a trained ecologist visited CY3 in September 2011 to make general observations of site conditions. Photographs taken during this visit are presented in Appendix K.

CY3 is located immediately south of Powerhouse No. 3 and immediately east of AP3 (Figure 1-2). Descriptions of the ecological resources in the vicinity of the CY3, including common flora and fauna species in the area, threatened or endangered species, and local habitats, are included in the AP3 SLERA (Shaw, 2013f).

The CY3 area is primarily covered almost entirely by herbaceous and shrubby vegetation. The former CY3 area has minimal relief, and no water bodies are present at the site.

6.4.2 Identification of Chemicals of Potential Ecological Concern

A screening process was performed on the CY3 analytical data from the RI to identify COPECs that may pose a threat to ecological receptors. These data include all CY1 soil samples collected to a depth of 6 feet. Sample locations are presented on Figure 6-1.

The COPEC selection process was performed to develop a subset of chemicals detected at the site that are not naturally occurring or associated with non-site-related sources. These chemicals may also be present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. Screening criteria and the selection process that were used to identify COPECs are described in more detail in Appendix K. The results of the COPEC soil screening are presented in Table 6-5.

6.4.3 SLERA Conclusions

Because no COPECs were identified at CY3, a predictive assessment is not triggered, and no further action for the protection of ecological receptors is considered necessary.

7.0 DERP-FUDS Project No. G05OH001821 Recommendations

The purpose of the RI is to gather information concerning the site characteristics so that appropriate remedial alternatives may be developed in the FS. However, it is unnecessary to perform an FS if the BHHRA indicates that the human health risk goals are met under baseline conditions and the ecological risk assessment indicates a lack of adverse ecological effects (USACE, 2004; DoD, 2012).

Based on the RI results, including the BHHRA and SLERA, USACE recommends no further action with respect to the and AP1, CY1, AP3, and CY3 sites. Therefore, an FS is not warranted for DERP-FUDS Project No. G05OH001821. This recommendation is based on the finding that the exposure to environmental media associated with these sites pose no unacceptable human health risks/hazards or ecological hazards that are attributable to past DoD practices.

8.0 References

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TABLES

Table 3-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB01						ASH PIT 1-SB02						ASH PIT 1-SB03					
				SAMPLE NO	AP0001		AP0002		AP0003		AP0004		AP0005		AP0006		AP0007		AP0008		**AP0009**	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	_5 - 1_5 Ft		3_5 - 5_5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 3_8 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																						
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	0.0477	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	0.0378	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																						
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	-	-			-	-					-	-	-	-		
METALS																						
Aluminum	mg/kg	7,700	15,500	13000	6,190	J	9,230	J	8,980	J	9,360	J	8,380	J	7,780	J	9,940		2,770		8,470	
Antimony	mg/kg	3.1	9.3	0.897	-	-	0.258	J	-	-	-	-	0.294	J	-	-	0.347	J	-	-	0.267	J
Arsenic	mg/kg	0.39	36.5	13.2	6.7	J	8.3	J	4.54	J	9.14	J	6.17	J	4.3	J	13.2		5.62		6.7	
Barium	mg/kg	1,500	826	451	32.7	J	37.7	J	51.5	J	83.3	J	35.9	J	56.1	J	107		13		46.7	
Beryllium	mg/kg	16	1	16.5	**5.74**	J	**4.87**	J	**5.82**	J	**10.8**	J	**5.99**	J	**5.23**	J	**13.9**	J	**3.62**	J	**5.49**	J
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	-	-	0.345	J	-	-	-	-	-	-	0.277	J
Calcium	mg/kg	NE	52,300	50900	14,400		35,200		50,900		18,800		46,600		45,700		9,390		26,700		48,600	
Chromium	mg/kg	0.29	29	19.5	10.6		13.9		13.4		12.4		11.9		11.5		13.6		5.51		11.7	
Cobalt	mg/kg	2.3	116	62.2	5.47		6.18		9.22		8.57		9.76		8.14		9.92		3.23		8.43	
Copper	mg/kg	310	56.2	50	15.4	J	25.4	J	27.6	J	27.3	J	37.7	J	24.4	J	30.5		7.71		27.3	
Iron	mg/kg	5,500	234,000	90300	17,200		15,600		20,200		36,500		21,500		18,000		63,100		10,600		18,900	
Lead	mg/kg	400	48.6	28.8	6.61		12.3		10.9		9.65		14.6		11.4		9.59		7.75		12.3	
Magnesium	mg/kg	NE	10,400	20100	5,030		**13,700**		**18,600**		5,830		**16,500**		**20,100**		1,500		6,420		**17,100**	
Manganese	mg/kg	180	3,506	4470	263		251		524		306		543		472		252		266		470	
Mercury	mg/kg	2.3	0.09	0.383	-	-	-	-	0.0162	J	0.0357		0.0196	J	0.0159	J	**0.0928**		-	-	0.0151	J
Nickel	mg/kg	150	55.1	43.4	3.93	J	13.3	J	16.9	J	-	-	18.7	J	15	J	-	-	1.71		14.7	
Potassium	mg/kg	NE	3,390	2440	577	J	1,130	J	1,270	J	1,190	J	1,110	J	1,080	J	1,260		299		1,070	
Selenium	mg/kg	39	2	0.984	-	-	-	-	-	-	0.618	J	-	-	-	-	0.567	J	-	-	-	-
Sodium	mg/kg	NE	NE	165	57.6		96		151		114		131		137		96.8		61.3		132	
Thallium	mg/kg	NE	1.3	0.663	-	-	0.366	J	0.271	J	-	-	0.343	J	-	-	0.563		-	-	0.301	J
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.3	J	20.9	J	26.3	J	20.6	J	20.3	J	29.9	J	15.1	J	20.5	J
Zinc	mg/kg	2,300	321.75	92.4	44.4		57.1		58.7		55.2		72.7		55.4		57.1		23.1		54.1	
GENERAL CHEMISTRY																						
Total organic carbon	mg/kg	NE	NE	55.3	55.3	J																

Table 3-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB04										ASH PIT 1-SB05					
				SAMPLE NO	AP0010		AP0011		AP0012		AP0062		AP0013		AP0014		AP0015		AP0016	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	**0 - 1 Ft**		3 - 4 Ft		3 - 4 Ft		3 - 4 Ft		8 - 10 Ft		0 - 1 Ft		3 - 3_7 Ft		8 - 9 Ft	
				SAMPLE PURPOSE	**REG**		REG		FD		FS		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	0.942	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.0661	J	-	-	-	-	-	-	-	-	0.764	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.055	J	-	-	-	-	-	-	-	-	0.275	J	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101			-	-	-	-	-	-			-	-	-	-		
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	12,700		7,340		6,910		6,680		10,200		10,700		6,260		8,810	
Antimony	mg/kg	3.1	9.3	0.897	0.352	J	-	-	-	-	-	-	0.304	J	0.416	J	-	-	0.276	J
Arsenic	mg/kg	0.39	36.5	13.2	11.7		3.72		3.42		6.2		8.59		9.06		11.6		5.78	
Barium	mg/kg	1,500	826	451	105		52.8		132		42.8		451		82.7		168		45.5	
Beryllium	mg/kg	16	1	16.5	**16.5**	J	**6.43**	J	**8.18**	J	-	-	-	-	**13.6**	J	**12.9**	J	**7**	J
Cadmium	mg/kg	7	NE	7.66	-	-	0.25	J	0.313	J	-	-	0.276	J	-	-	0.269	J	-	-
Calcium	mg/kg	NE	52,300	50900	3,330		2,570		2,790		2,300		2,300		35,100		2,960		36,000	
Chromium	mg/kg	0.29	29	19.5	12		11.7		11.5		11		17.7		16.4		13.5		13.7	
Cobalt	mg/kg	2.3	116	62.2	8.92		26.8		28.9		27.4		62.2		8.36		20.5		10.3	
Copper	mg/kg	310	56.2	50	50		9.5		11.3		7.9		30.7		47.9		10.4		29.2	
Iron	mg/kg	5,500	234,000	90300	90,300		18,700		27,400		21,900		32,800		64,800		62,000		23,600	
Lead	mg/kg	400	48.6	28.8	11.3		7.25		8.13		6.8		19.2		12.3		5.69		12	
Magnesium	mg/kg	NE	10,400	20100	782		1,150		1,020		1,140		3,480		4,010		961		**15,600**	
Manganese	mg/kg	180	3,506	4470	241		871		1,240		556		**4,470**		305		954		484	
Mercury	mg/kg	2.3	0.09	0.383	**0.383**		0.0305		0.0301		-	-	0.0195	J	0.0756		0.0592		0.0222	J
Nickel	mg/kg	150	55.1	43.4	-	-	14.4		8.92		27.9		43.4		-	-	-	-	16.1	
Potassium	mg/kg	NE	3,390	2440	1,280		298		281		-	-	948		1,160		164		1,110	
Selenium	mg/kg	39	2	0.984	0.6	J	-	-	-	-	-	-	-	-	0.592	J	-	-	0.984	U
Sodium	mg/kg	NE	NE	165	119		26		24		-	-	45.9		165		34.9		107	
Thallium	mg/kg	NE	1.3	0.663	0.356	J	-	-	-	-	-	-	0.354	J	0.303	J	-	-	0.405	J
Vanadium	mg/kg	39	40.9	37.6	32.4	J	22	J	26.1	J	20.5		29.3	J	27.9	J	37.6	J	24.2	J
Zinc	mg/kg	2,300	321.75	92.4	55.3		63.4		75.1		60.7		87		62.8		92.4		65.4	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 3-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB06						ASH PIT 1-SB08									
				SAMPLE NO	AP0017		AP0018		AP0019		AP0023		AP0024		AP0025		AP0063		AP0057	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	_8 - 1_8 Ft		5 - 5_8 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	0.31	J	-	-	-	-	0.247	J	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	0.231	J	-	-	-	-	0.2	J	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	1.02	J	0.0642	J	-	-	0.691	J	0.58	
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	0.839	J	0.0534	J	-	-	0.603	J	0.55	
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	1.34	J	0.0829	J	-	-	1.07	J	0.77	
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	0.989	J	0.0675	J	-	-	0.711	J	0.58	
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	2.06	J	0.126	J	-	-	1.69	J	1.3	
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	1.95	J	0.312	J	-	-	1.68	J	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	0.299	J	0.0553	J	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	0.796	J	0.075	J	-	-	0.866	J	0.51	
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	1.5	J	0.102	J	-	-	1.14	J	0.96	
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	-	-			0.101	J	-	-			-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	10,500	J	13,000	J	8,870	J	7,200		6,700	J	11,700		7,910		9,080	
Antimony	mg/kg	3.1	9.3	0.897	-	-	-	-	0.287	J	0.897		0.348	J	0.26	J	0.779		-	-
Arsenic	mg/kg	0.39	36.5	13.2	6.4	J	7.53	J	10.4	J	10.7		9.98	J	5.65		11.2		12.6	
Barium	mg/kg	1,500	826	451	62.6	J	73.6	J	32.6	J	89.5		109		42.3		79.3		76.5	
Beryllium	mg/kg	16	1	16.5	**11.5**	J	**6.55**	J	**6.71**	J	**12**	J	**11.5**	J	**7.18**	J	**10.2**	J	-	-
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	7.66		0.279	J	-	-	-	-	-	-	0.82	
Calcium	mg/kg	NE	52,300	50900	4,580		37,800		39,300		10,800		5,380	J	40,400		14,000		9,820	
Chromium	mg/kg	0.29	29	19.5	14.6		19.5		13.4		10.8		8.34		17		15.2		11.6	
Cobalt	mg/kg	2.3	116	62.2	10.1		10.1		11.2		7.28		5.37		10.1		6.15		6.7	
Copper	mg/kg	310	56.2	50	20.5	J	27	J	32.7	J	30.7		21.3		28.4		33.1		30.7	
Iron	mg/kg	5,500	234,000	90300	41,100		22,600		23,000		45,900		47,000		24,400		47,100		44,200	
Lead	mg/kg	400	48.6	28.8	8.3		12.2		13.1		28.8		9.36		13.6		25.3		19.6	
Magnesium	mg/kg	NE	10,400	20100	1,730		**11,700**		**11,600**		1,510		839		**12,100**		2,320		1,600	
Manganese	mg/kg	180	3,506	4470	199		701		373		343		469		347		341		254	
Mercury	mg/kg	2.3	0.09	0.383	0.0146	J	-	-	0.0148	J	**0.163**		0.0516		-	-	**0.151**		**0.16**	
Nickel	mg/kg	150	55.1	43.4	-	-	23.7	J	21.2	J	-	-	-	-	18.8		-	-	16.8	
Potassium	mg/kg	NE	3,390	2440	643	J	1,580	J	1,260	J	678		559		1,370		630		875	
Selenium	mg/kg	39	2	0.984	-	-	-	-	0.761	J	0.512	J	0.559	J	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	165	70.4		117		118		65.3	J	87.4		98.5		113	J	-	-
Thallium	mg/kg	NE	1.3	0.663	-	-	0.239	J	0.663		0.292	J	0.275	J	0.333	J	0.256	J	-	-
Vanadium	mg/kg	39	40.9	37.6	28.2	J	24.3	J	17	J	23.8	J	18.9	J	25.3	J	19.9	J	18.4	
Zinc	mg/kg	2,300	321.75	92.4	85.4		67.2		78		69.1		38.1		63.6		57.7		47.4	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 3-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB09									
				SAMPLE NO	AP0026		AP0027		AP0028		AP0058		AP0061	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08	
				DEPTH	0 - 1 Ft		3 - 4 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	0.0757	QJ	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.363	QJ	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.247	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.156	J	-	-	0.0778	J	0.0887	J	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-
PCBs														
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-								
METALS														
Aluminum	mg/kg	7,700	15,500	13000	7,650	J	7,640	J	8,650	J	8,130	J	10,700	
Antimony	mg/kg	3.1	9.3	0.897	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	13.2	12.6	J	5.13	J	9.16	J	9.95	J	8.2	
Barium	mg/kg	1,500	826	451	84.9	J	39	J	41.1	J	37.6	J	73.9	
Beryllium	mg/kg	16	1	16.5	**8.94**	J	**5.85**	J	**7.08**	J	**6.73**	J	-	-
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52,300	50900	15,600		46,200		37,700		39,800		50,200	
Chromium	mg/kg	0.29	29	19.5	10.7		11.7		13.5		12		17	
Cobalt	mg/kg	2.3	116	62.2	6.2		8.95		10.7		10.3		10.8	
Copper	mg/kg	310	56.2	50	18.2	J	26.6	J	30.1	J	31.4	J	23.1	
Iron	mg/kg	5,500	234,000	90300	26,500		20,600		24,200		24,200		24,100	
Lead	mg/kg	400	48.6	28.8	6.28		9		12.3		11.5		9.2	
Magnesium	mg/kg	NE	10,400	20100	3,740		**16,100**		10,300		**10,400**		**15,000**	
Manganese	mg/kg	180	3,506	4470	2,810		506		433		473		431	
Mercury	mg/kg	2.3	0.09	0.383	0.0383		0.0124	J	0.0142	J	0.0146	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	13.5	J	17.1	J	17.2	J	27.8	
Potassium	mg/kg	NE	3,390	2440	1,040	J	1,010	J	1,270	J	1,180	J	2,440	
Selenium	mg/kg	39	2	0.984	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	165	161		111		149		156		-	-
Thallium	mg/kg	NE	1.3	0.663	-	-	-	-	0.349	J	0.446	J	-	-
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.1	J	16.4	J	16.6	J	19.6	
Zinc	mg/kg	2,300	321.75	92.4	34.8		63.3		82.4		68.6		57.6	
GENERAL CHEMISTRY														
Total organic carbon	mg/kg	NE	NE	55.3										

Table 3-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
mg/kg - Milligram per kilogram.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
Q - Result calculated from linear regression. The instrument response is less than 20% of the instrument response of the low standard of the calibration curve. Per the analytical method, an instrument response below 20% of the low standard for any particular compound should be reported by the lab as non-detect.

Table 3-2

Detections Above RBSCs and/or BSCs in Temporary Piezometer Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-PZ01		ASH PIT 1-PZ02		ASH PIT 1-PZ04		ASH PIT 1-PZ04		ASH PIT 1-PZ04		ASH PIT 1-PZ05	
				SAMPLE NO	AP3000		AP3001		AP3003		WW3005		WW3013		AP3004	
				SAMPLE DATE	12-Dec-08		11-Dec-08		15-Dec-08		15-Dec-08		15-Dec-08		15-Dec-08	
				DEPTH	19 - 19 Ft		16 - 16 Ft		20 - 20 Ft		20 - 20 Ft		20 - 20 Ft		20 - 20 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FD		FS		REG	
				LOW-FLOW SAMPLED	Yes		Yes		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																
Amino-2,6-dinitrotoluene, 4-	µg/L	7.3	NE	0.342	-	-	-	-	-	-	-	-	-	-	0.342	J
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	9,740	**9,740**		**3,790**								**2,080**	
Barium	µg/L	730	11,800	90.1	90.1		72.9								41.5	B
Calcium	µg/L	NE	316,000	159,000	124,000		118,000								159,000	
Chromium	µg/L	0.043	NE	11.2	11.2		-	-							-	-
Cobalt	µg/L	1.1	12.1	2.91	-	-	2.91	J							-	-
Copper	µg/L	150	19.8	8.93	8.93	J	8.6	J							-	-
Iron	µg/L	2,600	1,550	7,030	**7,030**		**3,400**								**2,580**	
Lead	µg/L	15	NE	3.2	-	-	3.2	J							-	-
Magnesium	µg/L	NE	217,000	52,700	34,400		33,000								52,700	
Manganese	µg/L	88	636	3,370	71.4		306								**3,370**	
Nickel	µg/L	73	8.6	4.51	4.07	J	4.51	J							-	-
Potassium	µg/L	NE	116,000	9,130	4,270		1,680								9,130	
Sodium	µg/L	NE	1,390,000	11,500	11,500		9,740								59,400	B
Vanadium	µg/L	18	NE	19.4	19.4		8.07								4.24	J
METALS-FILTERED																
Barium	µg/L	730	11,800	37.1	37.1		30.5								32.2	B
Calcium	µg/L	NE	316,000	175,000	131,000		101,000								175,000	
Iron	µg/L	2,600	1,550	--	-	-	-	-							94.7	B
Lead	µg/L	15	NE	10.4	-	-	10.4								-	-
Magnesium	µg/L	NE	217,000	56,600	33,200		27,100								56,600	
Manganese	µg/L	88	636	3,540	10.7		35.2								**3,540**	
Potassium	µg/L	NE	116,000	9,270	898		657								9,270	
Sodium	µg/L	NE	1,390,000	12,000	12,000		11,100								62,500	B
Thallium	µg/L	NE	NE	5.08	-	-	5.08	J							-	-
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	246,000	133,000		172,000								246,000	
Chloride	µg/L	NE	NE	12,100	12,100		3,560									
Hardness	µg/L	NE	NE	614,000	451,000		431,000								614,000	
Hardness	µg/L	NE	NE	671,000	464,000		363,000								671,000	
Nitrate-Nitrite	µg/L	NE	NE	353	97		353								35	J
Sulfate	µg/L	NE	NE	61,700	61,700		39,400									
Total dissolved solids	µg/L	NE	NE	1,000,000	484,000		384,000								1,000,000	
Total suspended solids	µg/L	NE	NE	343,000	161,000		343,000								66,000	
Turbidity	NTU	NE	NE	195	111		195								101	

Table 3-2

Detections Above RBSCs and/or BSCs in Temporary Piezometer Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 3-3

Detections Above RBSC and/or BSCs in Overburden/Shale Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-MW01				AP1-MW02				AP1-MW03			
				SAMPLE NO	AP3050		AP3070		AP3051		AP3071		AP3052		AP3072	
				SAMPLE DATE	7-May-09		4-Nov-09		10-May-09		6-Nov-09		11-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	Yes		Yes		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																
Nitrotoluene, 2-	µg/L	0.31	NE	0.18	-	-	0.18	J	-	-	-	-	-	-	-	-
Nitrotoluene, 4-	µg/L	4.2	NE	0.17	-	-	0.17	J	-	-	-	-	-	-	-	-
VOLATILES																
Chloroform	µg/L	0.19	NE	0.48	0.48	J	-	-	-	-	-	-	-	-	-	-
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	1,110	26.1	J	191	J	76.8	J	68.7	J	**1,110**	J	17.2	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	5.4	J	-	-	-	-	-	-	6.3	J
Barium	µg/L	730	11,800	252	28.6	J	37.8	J	61	J	53.1	J	252		154	J
Calcium	µg/L	NE	316,000	282,000	282,000		194,000		207,000		169,000		93,400		94,300	
Cobalt	µg/L	1.1	12.1	22.2	**22.2**	J	6.8	J	3	J	3.6	J	1	J	2.7	J
Iron	µg/L	2,600	1,550	4,610	**4,610**		**4,410**		-	-	-	-	1,090		-	-
Lead	µg/L	15	NE	4.3	4.3	J	2.6	B	-	-	2	B	2.2	J	2.4	B
Magnesium	µg/L	NE	217,000	92400	77,100		63,200		92,400		74,900		39,100		38,700	
Manganese	µg/L	88	636	32,300	**32,300**		**8,290**		351		436		136		463	
Nickel	µg/L	73	8.6	15.2	**13.3**	J	4.1		**15.2**	J	5.8	J	7.4	J	4.7	J
Potassium	µg/L	NE	116,000	28200	2,820	J	6,650	J	28,200		21,900		20,700		19,300	
Selenium	µg/L	18	NE	5.2	-	-	-	-	4.9	J	3.7	J	4.7	J	5.2	J
Sodium	µg/L	NE	1,390,000	81,300	18,900		42,900		68,400		81,300		52,400		59,300	
Thallium	µg/L	NE	NE	34.6	34.6		-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	2.9	-	-	-	-	1.2	J	-	-	2.9	J	-	-
Zinc	µg/L	1,100	507	23.2	23.2		8.6	B	13.4	J	-	-	14.3	J	7.7	B
METALS-FILTERED																
Aluminum	µg/L	3,700	309	3,320	-	-	-	-	15.5	J	12.8	J	19.1	J	**3,320**	
Arsenic	µg/L	0.045	7.4	6.2	-	-	6.2	J	-	-	-	-	-	-	5.7	J
Barium	µg/L	730	11,800	255	28.4	J	34.9	J	61.7	J	51.6	J	255		177	J
Calcium	µg/L	NE	316,000	283,000	283,000		181,000		201,000		165,000		90,500		95,500	
Chromium	µg/L	0.043	NE	5.5	-	-	-	-	-	-	-	-	-	-	5.5	J
Cobalt	µg/L	1.1	12.1	22.5	**22.5**	J	5.1	J	3.2	J	3.6	J	-	-	5.1	J
Copper	µg/L	150	19.8	10.5	-	-	-	-	-	-	-	-	-	-	10.5	J
Iron	µg/L	2,600	1,550	6,070	**4,590**		**4,990**		-	-	-	-	-	-	**6,070**	
Lead	µg/L	15	NE	5.8	5.8		-	-	2	J	2.2	J	-	-	4.9	J
Magnesium	µg/L	NE	217,000	90,800	77,600		61,000		90,800		75,000		38,400		39,200	
Manganese	µg/L	88	636	32,100	**32,100**		**6,270**		355		410		102		550	
Nickel	µg/L	73	8.6	14.8	**12.8**	J	3.9	J	**14.8**	J	6.1	J	6.6	J	**13.4**	J
Potassium	µg/L	NE	116,000	28,500	2,760	J	7,000	J	28,500		22,000		20,400		20,500	
Selenium	µg/L	18	NE	6.9	-	-	-	-	6.9	J	-	-	5.3	J	-	-
Sodium	µg/L	NE	1,390,000	81,700	21,000		44,300		69,900		81,700		53,900		60,500	
Thallium	µg/L	NE	NE	37.8	37.8		-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	5.9	-	-	-	-	1.1	J	-	-	0.9	J	5.9	J
Zinc	µg/L	1,100	507	23.4	23.2		9.2	J	12.1	J	11.4	J	11.4	J	23.4	

Table 3-3

Detections Above RBSC and/or BSCs in Overburden/Shale Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-MW01				AP1-MW02				AP1-MW03			
				SAMPLE NO	AP3050		AP3070		AP3051		AP3071		AP3052		AP3072	
				SAMPLE DATE	7-May-09		4-Nov-09		10-May-09		6-Nov-09		11-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	Yes		Yes		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	448,000	448,000		395,000		253,000		313,000		349,000		391,000	
Chloride	µg/L	NE	NE	40,000	11,500		40,000		25,600		35,400		38,700		37,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	1,020,000		745,000		897,000		730,000		394,000		395,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	130	J	-	-	41	J	-	-	55	J
Sulfate	µg/L	NE	NE	589,000	585,000		311,000	J	589,000		358,000	J	127,000		109,000	
Total dissolved solids	µg/L	NE	NE	1,890,000	1,520,000		1,080,000		1,890,000		1,230,000		660,000		619,000	
Total suspended solids	µg/L	NE	NE	300,000	-	-	25,000		23,000		6,000	J	78,000		300,000	
Turbidity	NTU	NE	NE	47	8.6		47		5.4	J	3.4		18.7		27.8	

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 3-4

Detections Above RBSCs and/or BSCs in Bedrock Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-BEDGW-001				AP1-BEDGW-002				IT-MNTA-BEDGW-001			
				SAMPLE NO	AP3053		AP3073		AP3054		AP3074		LB3074		BEDGW-001-1109	
				DATE	9-May-09		6-Nov-09		10-May-09		10-Nov-09		19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	No		No		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
VOLATILES																
Acetone	µg/L	2,200	NE	463	140	J	463	J	-	-	92.9	B	345	J	-	-
Benzene	µg/L	0.41	2.4	1300	**613**		**1,300**		**67.1**		**27.5**		-	-	**3.7**	
Butanone, 2-	µg/L	710	NE	299	71.5		299		10.9		-	-	81.3	J	-	-
Carbon disulfide	µg/L	100	NE	12.3	12.3	J	-	-	3	J	1.9	J	11.6	J	3.8	
Chloroform	µg/L	0.19	NE	66.7	18		-	-	-	-	12		66.7		-	-
Chloromethane	µg/L	19	NE	216	-	-	-	-	-	-	216		-	-	-	-
Ethylbenzene	µg/L	1.5	0.87	176	**126**		**176**		**45.6**		**30.9**		**16.7**	J	**9.9**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	-	-	-	-	-	-	-	-	3.3	J
Methylene chloride	µg/L	4.8	NE	77.6	11.2	B	28.8	J	3	B	-	-	77.6	J	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	-	-	0.53	J	-	-	-	-	1.2	
Toluene	µg/L	230	1.7	730	**490**		**730**		**69.2**		**43.6**		**14.2**	J	**10**	
Xylenes, total	µg/L	20	5.5	1340	**1,060**		**1,340**		**473**		**370**		**235**		**136**	
SEMIVOLATILES																
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	9	J	8	J	-	-	0.97	J	-	-	-	-
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	24.7		20.7		2	J	2.8	J	-	-	-	-
Fluorene	µg/L	150	NE	5.4	-	-	-	-	-	-	-	-	5.4	J	-	-
Methylnaphthalene, 2-	µg/L	15	NE	256	36.2		32.7		14.5		14.5		71		256	J
Methylphenol, 2-	µg/L	180	NE	6.9	6.9	J	6.2	J	-	-	-	-	-	-	-	-
Naphthalene	µg/L	0.14	NE	64.9	33		33.2		11.8		15.3		17.7	J	64.9	J
Phenanthrene	µg/L	NE	NE	37.3	-	-	-	-	-	-	-	-	12.7	J	37.3	J
Phenol	µg/L	1,100	NE	6.6	6.6	J	6.6	J	-	-	-	-	-	-	-	-
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	90.4	57.2	J	45.3	J	67.5	J	46.7	J	90.4	B	79.6	J
Antimony	µg/L	1.5	NE	5.8	-	-	-	-	5.8	J	-	-	-	-	-	-
Arsenic	µg/L	0.045	7.4	110	**69.7**		**110**		**101**		**50.7**		-	-	-	-
Barium	µg/L	730	11,800	989	897		989		555		434		343		305	
Cadmium	µg/L	1.8	NE	1.4	-	-	-	-	-	-	-	-	1.4	J	-	-
Calcium	µg/L	NE	316,000	590000	**573,000**		**590,000**		246,000		220,000		314,000	J	280,000	
Copper	µg/L	150	19.8	0	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	2,600	1,550	4910	**4,910**		**1,570**		322		335	J	591		180	J
Lead	µg/L	15	NE	2.6	-	-	-	-	-	-	-	-	2.6	J	-	-
Magnesium	µg/L	NE	217,000	479000	**418,000**		**479,000**		155,000		155,000		**234,000**		212,000	
Manganese	µg/L	88	636	857	**857**		**704**		548		38		95.5		85.8	
Nickel	µg/L	73	8.6	5.8	5.8	J	2.8	J	-	-	-	-	-	-	-	-
Potassium	µg/L	NE	116,000	129000	110,000		**129,000**		59,600		88,800	J	111,000		**120,000**	
Selenium	µg/L	18	NE	11.9	11.9	J	-	-	6.3	J	5.2	J	-	-	-	-
Sodium	µg/L	NE	1,390,000	1470000	1,300,000		**1,470,000**		573,000		889,000		1,230,000		1,130,000	
Thallium	µg/L	NE	NE	5.3	5.3	J	-	-	-	-	-	-	3.8	J	-	-
Vanadium	µg/L	18	NE	2.8	2.2	J	-	-	2.6	J	1.3	J	2.8	J	1.6	J
Zinc	µg/L	1,100	507	16	11.5	J	8	B	16	J	7.7	J	11.6	J	11.5	B

Table 3-4

Detections Above RBSCs and/or BSCs in Bedrock Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-BEDGW-001				AP1-BEDGW-002				IT-MNTA-BEDGW-001			
				SAMPLE NO	AP3053		AP3073		AP3054		AP3074		LB3074		BEDGW-001-1109	
				DATE	9-May-09		6-Nov-09		10-May-09		10-Nov-09		19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	No		No		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS-FILTERED																
Aluminum	µg/L	3,700	309	409	23.2	J	26.1	J	**409**		24.8	J	43.3	J	52.6	J
Antimony	µg/L	1.5	NE	5.4	-	-	-	-	5.4	J	-	-	-	-	-	-
Arsenic	µg/L	0.045	7.4	133	**65.6**		**133**		**77.7**		**36.7**		-	-	-	-
Barium	µg/L	730	11,800	961	813		961		307		406		329		304	
Cadmium	µg/L	1.8	NE	0	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	NE	316,000	596000	**521,000**		**596,000**		153,000		200,000		312,000		275,000	
Copper	µg/L	150	19.8	43.1	-	-	-	-	**43.1**		-	-	-	-	-	-
Iron	µg/L	2,600	1,550	124	-	-	77.4	J	124	J	-	-	-	-	-	-
Lead	µg/L	15	NE	7.5	-	-	-	-	7.5	J	-	-	2	J	2.3	J
Magnesium	µg/L	NE	217,000	471000	**427,000**		**471,000**		96,800		148,000		**231,000**		211,000	
Manganese	µg/L	88	636	804	**804**		**658**		379		10.5	J	47		70.2	
Nickel	µg/L	73	8.6	55.2	3.8	J	-	-	**55.2**		-	-	-	-	-	-
Potassium	µg/L	NE	116,000	131000	107,000		**131,000**		45,300		84,800	J	113,000		**120,000**	
Selenium	µg/L	18	NE	16.7	16.7	J	-	-	15	J	4	J	-	-	4.2	J
Sodium	µg/L	NE	1,390,000	1410000	1,300,000		**1,410,000**		644,000		833,000		1,210,000		1,160,000	
Thallium	µg/L	NE	NE	0	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	3.1	2	J	-	-	3.1	J	-	-	2.7	J	0.93	J
Zinc	µg/L	1,100	507	140	8.3	J	-	-	140		-	-	11.2	J	-	-
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	773000	386,000		453,000		678,000		728,000		773,000		718,000	
Chloride	µg/L	NE	NE	4280000	2,840,000		4,280,000		705,000		2,020,000	J	132,000		2,550,000	
Cyanide, total	µg/L	73	NE	120	37	J	-	-	120	J	-	-	71		-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	3,150,000		3,450,000		1,250,000				1,740,000		1,570,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	46	J	-	-	190	J	-	-	90	J
Sulfate	µg/L	NE	NE	93400	13,600		-	-	93,400		-	-	9,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	9,580,000		7,680,000		3,130,000		3,520,000		5,780,000		4,680,000	
Total suspended solids	µg/L	NE	NE	250000	250,000		26,000		88,000		130,000		53,000		193,000	
Turbidity	NTU	NE	NE	296	35.1	J	296		6.3	J	180	J	66	J	71.5	

Table 3-4

Detections Above RBSCs and/or BSCs in Bedrock Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 3-5

Detections Above RBSCs in Surface Water Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP1-SW01		AP1-SW02		AP1-SW03		AP1-SW04	
			SAMPLE NO	AP2007		AP2008		AP2012		AP2013	
			SAMPLE DATE	19-May-09		19-May-09		19-May-09		20-May-09	
			DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE PURPOSE	REG		REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS											
Aluminum	µg/L	37,000	8,770	83.8	J	31.8	J	31.9	J	8,770	
Arsenic	µg/L	0.045	8.3	-	-	-	-	-	-	8.3	J
Barium	µg/L	7,300	80	36.6	J	33.8	J	31.9	J	80	J
Calcium	µg/L	NE	222,000	145,000		143,000		139,000		222,000	
Chromium	µg/L	0.043	13.9	-	-	-	-	-	-	13.9	
Cobalt	µg/L	11	6.9	-	-	-	-	-	-	6.9	J
Copper	µg/L	1,500	19.2	-	-	-	-	-	-	19.2	J
Iron	µg/L	26,000	15,100	31.1	J	-	-	26.6	J	15,100	
Lead	µg/L	15	15	2.1	J	-	-	2	J	15	
Magnesium	µg/L	NE	36,900	26,200		26,600		26,300		36,900	
Manganese	µg/L	880	836	488		396		247		836	
Nickel	µg/L	730	26.2	-	-	-	-	-	-	26.2	J
Potassium	µg/L	NE	11,800	2,170	J	2,040	J	2,030	J	11,800	
Sodium	µg/L	NE	9,140	6,400	J	7,050	J	6,850	J	9,140	J
Vanadium	µg/L	180	20	-	-	-	-	-	-	20	J
Zinc	µg/L	11,000	93.2	13.2	J	9.6	J	10.8	J	93.2	

RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
"-" - Not Detected.
µg/L - Parts per billion.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.

Table 3-6

Detections Above RBSCs in Sediment Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP1-SD01		AP1-SD02		AP1-SD03		AP1-SD04	
			SAMPLE NO	AP1007		AP1008		AP1012		AP1013	
			SAMPLE DATE	19-May-09		19-May-09		19-May-09		20-May-09	
			DEPTH	0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft	
			SAMPLE PURPOSE	REG		REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES											
Benzo(a)anthracene	mg/kg	0.15	0.121	-	-	-	-	-	-	0.121	J
Benzo(a)pyrene	mg/kg	0.015	0.112	-	-	-	-	-	-	0.112	J
Benzo(b)fluoranthene	mg/kg	0.15	0.175	-	-	-	-	-	-	0.175	J
Chrysene	mg/kg	15	0.149	-	-	-	-	-	-	0.149	J
Dibenzofuran	mg/kg	78	0.15	-	-	-	-	-	-	0.15	J
Di-n-butyl phthalate	mg/kg	6,100	0.18	-	-	0.18	J	-	-	-	-
Fluoranthene	mg/kg	2,300	0.191	-	-	-	-	-	-	0.191	J
Methylnaphthalene, 2-	mg/kg	310	0.616	-	-	-	-	-	-	0.616	
Naphthalene	mg/kg	36	0.337	-	-	-	-	-	-	0.337	J
Phenanthrene	mg/kg	NE	0.306	-	-	-	-	-	-	0.306	J
Pyrene	mg/kg	1,700	0.195	-	-	-	-	-	-	0.195	J
PCBs											
Aroclor 1254	mg/kg	0.11	0.0352	0.025	J	-	-	-	-	0.0352	J
Aroclor 1260	mg/kg	0.22	0.113	0.0207	J	-	-	-	-	0.113	J
METALS											
Aluminum	mg/kg	77,000	9880	9,880		7,130		4,490		9,860	
Antimony	mg/kg	31	1.3	0.5	J	0.7	J	-	-	1.3	J
Arsenic	mg/kg	0.39	15.9	7.6		9.3		4		15.9	
Barium	mg/kg	15,000	110	57.5		35.7		31.3		110	
Beryllium	mg/kg	160	1.6	0.62		0.5		0.3	J	1.6	
Cadmium	mg/kg	70	0.59	0.55		0.32		0.23	J	0.59	
Calcium	mg/kg	NE	29900	29,900		10,400		16,800		13,700	
Chromium	mg/kg	0.29	16.9	16.9		11.8		7.8		15.6	
Cobalt	mg/kg	23	9.9	9.9		8.9		4.4		9.1	
Copper	mg/kg	3,100	38.5	38.5		17.1		10.5		24.5	
Iron	mg/kg	55,000	21700	21,700		19,300		9,270		21,400	
Lead	mg/kg	400	23.7	23.7		13		7	J	22.9	
Magnesium	mg/kg	NE	9370	9,370		4,360		4,970		1,810	
Manganese	mg/kg	1,800	1670	446		337		165		1,670	
Mercury	mg/kg	23	0.14	0.14		0.024	J	0.021	J	0.11	J
Nickel	mg/kg	1,500	26.7	26.7		21.3		12		25.7	
Potassium	mg/kg	NE	1740	1,740		1,170		725	J	1,340	
Selenium	mg/kg	390	1.3	0.32	J	0.38	J	-	-	1.3	J
Silver	mg/kg	390	0.099	0.099	J	-	-	-	-	-	-
Sodium	mg/kg	NE	112	112	J	-	-	83.1	J	-	-
Vanadium	mg/kg	390	25.5	21.9		19.2		12.4		25.5	

Table 3-6

Detections Above RBSCs in Sediment Samples - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP1-SD01		AP1-SD02		AP1-SD03		AP1-SD04	
			SAMPLE NO	AP1007		AP1008		AP1012		AP1013	
			SAMPLE DATE	19-May-09		19-May-09		19-May-09		20-May-09	
			DEPTH	0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft	
			SAMPLE PURPOSE	REG		REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Zinc	mg/kg	23,000	137	98.9		45.3		33.3		137	
GENERAL CHEMISTRY											
Total organic carbon	mg/kg	NE	43000	21,000						43,000	

Sediment samples AP1010 and AP1011 were analyzed only for explosives and polychlorinated biphenyls. Since neither contaminants were present, no data are shown.

NE - Not established (RBSCs).
Shaded cell indicates value is greater than RBSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
"-" - Not Detected.
mg/kg - Milligrams per kilogram.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.

Table 3-7

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	13 / 13	100	6.19E+03	J	1.66E+04		3.81E+00	4.89E+01	9.89E+03	1.55E+04	7700		Y	1.13E+04	1.13E+04
Antimony	4 / 13	31	3.47E-01	J	8.38E-01		4.60E-01	2.60E+00	5.98E-01	9.30E+00	3.1		N (b)		---
Arsenic	13 / 13	100	6.40E+00	J	3.12E+01		9.19E-01	2.60E+00	1.25E+01	3.65E+01	0.39		N (b)		---
Barium	13 / 13	100	3.27E+01	J	1.63E+02		1.90E-01	4.89E+01	9.09E+01	8.26E+02	1500		N (b)		---
Beryllium	9 / 13	69	1.50E+00		1.65E+01	J	1.90E-01	1.20E+00	7.31E+00	1.00E+00	16		Y	1.14E+01	1.14E+01
Cadmium	1 / 13	8	2.60E-01	J/U	2.60E-01	J/U	2.60E-01	6.10E-01	2.40E-01	NA	7		N (a)		---
Calcium	13 / 13	100	3.33E+03		5.91E+04		4.76E+00	1.22E+03	1.50E+04	5.23E+04	Nutrient		N (c)		---
Chromium	13 / 13	100	1.05E+01		1.81E+01		4.76E-01	1.30E+00	1.31E+01	2.90E+01	0.29		N (b)		---
Cobalt	12 / 13	92	5.47E+00		2.60E+01		1.90E-01	1.22E+01	8.89E+00	1.16E+02	2.3		N (b)		---
Copper	13 / 13	100	1.35E+01		5.00E+01		4.76E-01	6.10E+00	2.78E+01	5.62E+01	310		N (b)		---
Iron	13 / 13	100	1.72E+04		9.51E+04		3.97E+00	2.62E+01	5.19E+04	2.34E+05	5500		N (b)		---
Lead	13 / 13	100	4.90E+00		2.71E+01		3.90E-01	7.90E-01	9.53E+00	4.86E+01	400		N (b)		---
Magnesium	12 / 13	92	6.51E+02		5.83E+03		1.90E+00	1.22E+03	2.49E+03	1.04E+04	Nutrient		N (c)		---
Manganese	13 / 13	100	1.25E+02		2.81E+03		1.90E-01	3.90E+00	5.71E+02	3.51E+03	180		N (b)		---
Mercury	7 / 13	54	1.46E-02	J	3.83E-01		2.46E-02	2.40E-01	9.34E-02	8.50E-02	2.3		N (a)		---
Nickel	6 / 13	46	3.93E+00	J	7.92E+01		2.86E-01	9.80E+00	1.28E+01	5.51E+01	150		N (a)		---
Potassium	11 / 13	85	5.77E+02	J	1.28E+03		2.38E+01	1.22E+03	8.90E+02	3.39E+03	Nutrient		N (c)		---
Selenium	9 13	69	4.97E-01	J/U	2.70E+00		6.50E-01	1.30E+00	9.49E-01	2.00E+00	39		N (a)		---
Sodium	8 / 13	62	5.76E+01		1.65E+02		9.54E+00	1.22E+03	2.23E+02	NA	Nutrient		N (c)		---
Thallium	4 / 13	31	2.74E-01	JJ	5.63E-01		4.60E-01	2.60E+00	5.63E-01	1.30E+00	0.51	g	N (b)		---
Vanadium	13 / 13	100	1.44E+01		3.92E+01		1.90E-01	1.31E+01	2.48E+01	4.09E+01	39		N (b)		---
Zinc	11 / 13	85	3.48E+01		9.58E+01		2.38E+00	5.20E+00	5.11E+01	3.22E+02	2300		N (b)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	1 / 7	14	1.03E-01	J/U	1.03E-01	JU	2.02E-01	2.69E-01	1.16E-01		0.22		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 13	8	2.79E-01	JJ	2.79E-01	JJ	4.10E-01	2.37E+00	3.25E-01		340	h	N (a)		---
Anthracene	1 / 13	8	2.16E-01	JJ	2.16E-01	JJ	4.10E-01	2.37E+00	3.20E-01		1700		N (a)		---
Benzo(a)anthracene	1 / 13	8	8.56E-01	JJ	8.56E-01	JJ	4.10E-01	2.37E+00	3.69E-01		0.15		Y	7.33E-01	7.33E-01
Benzo(a)pyrene	1 / 13	8	7.21E-01	JJ	7.21E-01	JJ	4.10E-01	2.37E+00	3.59E-01		0.015		Y	7.03E-01	7.03E-01
Benzo(b)fluoranthene	1 / 13	8	1.21E+00	JJ	1.21E+00	JJ	4.10E-01	2.37E+00	3.96E-01		0.15		Y	8.29E-01	8.29E-01
Chrysene	1 / 13	8	8.50E-01	JJ	8.50E-01	JJ	4.10E-01	2.37E+00	3.69E-01		15		N (a)		---
Dibenzofuran	1 / 13	8	7.57E-02	QJ	7.57E-02	QJ	4.10E-01	2.37E+00	3.69E-01		7.8		N (a)		---
Fluoranthene	2 / 13	15	4.77E-02	QJ	1.88E+00	JJ	4.10E-01	2.37E+00	4.35E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 13	8	1.82E+00	JJ	1.82E+00	JJ	4.10E-01	2.37E+00	4.43E-01		0.15		Y	1.03E+00	1.03E+00
Methylnaphthalene, 2-	2 / 13	15	3.63E-01	QJ	9.42E-01	J	4.10E-01	2.37E+00	3.72E-01		31		N (a)		---
Naphthalene	4 / 13	31	6.61E-02	J	7.64E-01	J	4.10E-01	2.37E+00	3.07E-01		3.6		N (a)		---
Phenanthrene	4 / 13	31	5.50E-02	J	8.31E-01	JJ	4.10E-01	2.37E+00	2.75E-01		170	i	N (a)		---
Pyrene	2 / 13	15	3.78E-02	QJ	1.32E+00	JJ	4.10E-01	2.37E+00	3.92E-01		170		N (a)		---

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
Q - Data are biased high due to a calibration error.
RBSC - Risk-based screening concentration.

Table 3-7

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and development, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on thallium from IRIS, 2009.
[n] RBSC based on acenapthene.
[l] RBSC based on pyrene.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-8

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil - AP1
Ash Pit 1 and Ash Pit 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]
Inorganics													
Aluminum	17 / 17	100	2.77E+03		1.30E+04	J	3.31E+00	2.53E+01	8.64E+03	1.55E+04	7700		N (b)
Antimony	8 / 17	47	2.58E-01	J	3.48E-01	J	4.15E-01	1.30E+00	2.79E-01	9.30E+00	3.1		N (a)
Arsenic	17 / 17	100	3.57E+00		1.58E+01		8.31E-01	1.30E+00	7.60E+00	3.65E+01	0.39		N (b)
Barium	17 / 17	100	1.30E+01		4.51E+02		1.65E-01	2.53E+01	8.31E+01	8.26E+02	1500		N (a)
Beryllium	16 / 17	94	3.62E+00	J	1.29E+01	J	1.65E-01	6.30E-01	6.57E+00	1.00E+00	16		N (a)
Cadmium	6 / 17	35	2.69E-01	J	7.66E+00		2.50E-01	5.31E-01	6.83E-01	NA	7		Y
Calcium	17 / 17	100	2.30E+03		5.09E+04		4.46E+00	6.32E+02	3.00E+04	5.23E+04	Nutrient		N (c)
Chromium	17 / 17	100	5.51E+00		2.07E+01		4.13E-01	6.30E-01	1.34E+01	2.90E+01	0.29		N (b)
Cobalt	17 / 17	100	3.23E+00		6.22E+01		1.65E-01	6.30E+00	1.39E+01	1.16E+02	2.3		N (b)
Copper	17 / 17	100	7.71E+00		3.77E+01	J	4.13E-01	3.20E+00	2.50E+01	5.62E+01	310		N (a)
Iron	17 / 17	100	1.06E+04		6.20E+04		3.31E+00	1.96E+01	2.67E+04	2.34E+05	5500		N (b)
Lead	17 / 17	100	5.69E+00		1.92E+01		3.80E-01	5.31E-01	1.14E+01	4.86E+01	400		N (a)
Magnesium	17 / 17	100	8.39E+02		2.01E+04		1.65E+00	6.32E+02	1.07E+04	1.04E+04	Nutrient		N (c)
Manganese	17 / 17	100	2.51E+02		4.47E+03		1.65E-01	1.90E+00	7.50E+02	3.51E+03	180		Y
Mercury	12 / 17	71	1.24E-02	J	5.92E-02		2.07E-02	1.30E-01	2.38E-02	8.50E-02	2.3		N (a)
Nickel	15 / 17	88	1.71E+00		4.43E+01		2.48E-01	5.10E+00	1.71E+01	5.51E+01	150		N (a)
Potassium	17 / 17	100	1.64E+02		1.72E+03		2.07E+01	6.32E+02	1.01E+03	3.39E+03	Nutrient		N (c)
Selenium	3 / 17	18	5.59E-01	J	9.70E-01		6.30E-01	1.06E+00	5.21E-01	2.00E+00	39		N (a)
Sodium	16 / 17	94	2.50E+01		1.53E+02		8.26E+00	6.32E+02	1.13E+02	NA	Nutrient		N (c)
Thallium	11 / 17	65	2.39E-01	J	6.63E-01		4.15E-01	1.30E+00	3.38E-01	1.30E+00	0.51	e	N (b)
Vanadium	17 / 17	100	1.51E+01	J	3.76E+01	J	1.65E-01	6.30E+00	2.23E+01	4.09E+01	39		N (a)
Zinc	17 / 17	100	2.31E+01		9.24E+01		2.07E+00	2.50E+00	6.44E+01	3.22E+02	2300		N (a)
Semivolatile Organic Compounds													
Benzo(a)anthracene	1 / 17	6	6.42E-02	J	6.42E-02	J	3.73E-01	4.68E-01	1.93E-01		0.15		N (a)
Benzo(a)pyrene	1 / 17	6	5.34E-02	J	5.34E-02	J	3.73E-01	4.68E-01	1.93E-01		0.015		Y
Benzo(b)fluoranthene	1 / 17	6	8.29E-02	J	8.29E-02	J	3.73E-01	4.68E-01	1.95E-01		0.15		N (a)
Chrysene	1 / 17	6	6.75E-02	J	6.75E-02	J	3.73E-01	4.68E-01	1.94E-01		15		N (a)
Fluoranthene	1 / 17	6	1.26E-01	J	1.26E-01	J	3.73E-01	4.68E-01	1.97E-01		230		N (a)
Indeno(1,2,3-cd)pyrene	1 / 17	6	3.12E-01	J	3.12E-01	J	3.73E-01	4.68E-01	2.08E-01		0.15		Y
Naphthalene	1 / 17	6	5.53E-02	J	5.53E-02	J	3.73E-01	4.68E-01	1.93E-01		3.6		N (a)
Phenanthrene	2 / 17	12	7.50E-02	J	8.33E-02	JJ	3.73E-01	4.68E-01	1.88E-01		170	f	N (a)
Pyrene	1 / 17	6	1.02E-01	J	1.02E-01	J	3.73E-01	4.68E-01	1.96E-01		170		N (a)

Note: Exposure point concentrations (EPC) are not provided. The subsurface soil and surface soil data sets are combined for all Ash Pit No. 1 soil pathways as "total soil" to evaluate soil exposure for future receptors. EPCs for these receptors are based on total soil. See Table 3-9.
BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

Table 3-8

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil - AP1
Ash Pit 1 and Ash Pit 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

mg/kg - Milligrams per kilogram.
NA - Not available.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] RBSC based on thallium from EPA, 2009, Integrated Risk Information System (IRIS), on line.
[f] RBSC based on pyrene.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-9

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	30 / 30	100	2.77E+03		1.66E+04		3.31E+00	4.89E+01	9.18E+03	1.55E+04	7700		Y	1.00E+04	1.00E+04
Antimony	12 / 30	40	2.58E-01	J	8.38E-01		4.15E-01	2.60E+00	4.18E-01	9.30E+00	3.1		N (b)		---
Arsenic	30 / 30	100	3.57E+00		3.12E+01		8.31E-01	2.60E+00	9.71E+00	3.65E+01	0.39		N (b)		---
Barium	30 / 30	100	1.30E+01		4.51E+02		1.65E-01	4.89E+01	8.65E+01	8.26E+02	1500		N (b)		---
Beryllium	25 / 30	83	1.50E+00		1.65E+01	J	1.65E-01	1.20E+00	6.89E+00	1.00E+00	16		Y	8.52E+00	8.52E+00
Cadmium	7 / 30	23	2.60E-01	J/U	7.66E+00		2.50E-01	6.10E-01	4.91E-01	NA	7		Y	1.26E+00	1.26E+00
Calcium	30 / 30	100	2.30E+03		5.91E+04		4.46E+00	1.22E+03	2.35E+04	5.23E+04	Nutrient		N (c)		---
Chromium	30 / 30	100	5.51E+00		2.07E+01		4.13E-01	1.30E+00	1.33E+01	2.90E+01	0.29		N (b)		---
Cobalt	29 / 30	97	3.23E+00		6.22E+01		1.65E-01	1.22E+01	1.17E+01	1.16E+02	2.3		N (b)		---
Copper	30 / 30	100	7.71E+00		5.00E+01		4.13E-01	6.10E+00	2.62E+01	5.62E+01	310		N (b)		---
Iron	30 / 30	100	1.06E+04		9.51E+04		3.31E+00	2.62E+01	3.76E+04	2.34E+05	5500		N (b)		---
Lead	30 / 30	100	4.90E+00		2.71E+01		3.80E-01	7.90E-01	1.06E+01	4.86E+01	400		N (b)		---
Magnesium	29 / 30	97	6.51E+02		2.01E+04		1.65E+00	1.22E+03	7.12E+03	1.04E+04	Nutrient		N (c)		---
Manganese	30 / 30	100	1.25E+02		4.47E+03		1.65E-01	3.90E+00	6.72E+02	3.51E+03	180		Y	1.37E+03	1.37E+03
Mercury	19 / 30	63	1.24E-02	J	3.83E-01		2.07E-02	2.40E-01	5.40E-02	8.50E-02	2.3		N (a)		---
Nickel	21 / 30	70	1.71E+00		7.92E+01		2.48E-01	9.80E+00	1.52E+01	5.51E+01	150		N (a)		---
Potassium	28 / 30	93	1.64E+02		1.72E+03		2.07E+01	1.22E+03	9.59E+02	3.39E+03	Nutrient		N (c)		---
Selenium	12 / 30	40	4.97E-01	J/U	2.70E+00		6.30E-01	1.30E+00	7.06E-01	2.00E+00	39		N (a)		---
Sodium	24 / 30	80	2.50E+01		1.65E+02		8.26E+00	1.22E+03	1.61E+02	NA	Nutrient		N (c)		---
Thallium	15 / 30	50	2.39E-01	J	6.63E-01		4.15E-01	2.60E+00	4.35E-01	1.30E+00	0.51	g	N (b)		---
Vanadium	30 / 30	100	1.44E+01		3.92E+01		1.65E-01	1.31E+01	2.34E+01	4.09E+01	39		N (b)		---
Zinc	28 / 30	93	2.31E+01		9.58E+01		2.07E+00	5.20E+00	5.87E+01	3.22E+02	2300		N (b)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	1 / 13	8	1.03E-01	J/U	1.03E-01	J/U	4.00E-02	2.69E-01	1.04E-01		0.22		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 30	3	2.79E-01	JJ	2.79E-01	JJ	3.73E-01	2.37E+00	2.56E-01		340	h	N (a)		---
Anthracene	1 / 30	3	2.16E-01	JJ	2.16E-01	JJ	3.73E-01	2.37E+00	2.54E-01		1700		N (a)		---
Benzo(a)anthracene	2 / 30	7	6.42E-02	J	8.56E-01	JJ	3.73E-01	2.37E+00	2.70E-01		0.15		Y	2.57E-01	2.57E-01
Benzo(a)pyrene	2 / 30	7	5.34E-02	J	7.21E-01	JJ	3.73E-01	2.37E+00	2.65E-01		0.015		Y	2.16E-01	2.16E-01
Benzo(b)fluoranthene	2 / 30	7	8.29E-02	J	1.21E+00	JJ	3.73E-01	2.37E+00	2.82E-01		0.15		Y	3.47E-01	3.47E-01
Chrysene	2 / 30	7	6.75E-02	J	8.50E-01	JJ	3.73E-01	2.37E+00	2.69E-01		15		N (a)		---
Dibenzofuran	1 / 30	3	7.57E-02	QJ	7.57E-02	QJ	3.73E-01	2.37E+00	2.75E-01		7.8		N (a)		---
Fluoranthene	3 / 30	10	4.77E-02	QJ	1.88E+00	JJ	3.73E-01	2.37E+00	3.00E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	2 / 30	7	3.12E-01	J	1.82E+00	JJ	3.73E-01	2.37E+00	3.10E-01		0.15		Y	4.46E-01	4.46E-01
Methylnaphthalene, 2-	2 / 30	7	3.63E-01	QJ	9.42E-01	J	3.73E-01	2.37E+00	2.76E-01		31		N (a)		---
Naphthalene	5 / 30	17	5.53E-02	J	7.64E-01	J	3.73E-01	2.37E+00	2.43E-01		3.6		N (a)		---
Phenanthrene	6 / 30	20	5.50E-02	J	8.31E-01	JJ	3.73E-01	2.37E+00	2.26E-01		170	i	N (a)		---
Pyrene	3 / 30	10	3.78E-02	QJ	1.32E+00	JJ	3.73E-01	2.37E+00	2.81E-01		170		N (a)		---

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
Q - Data is biased high due to a calibration error.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

Table 3-9

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on thallium from EPA, 2009, Integrated Risk Information System (IRIS), on line.
[h] RBSC based on acenapthene.
[i] RBSC based on pyrene.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-10

Statistical Summary and Selection of Chemicals of Potential Concern in Bedrock Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	BSC [a] µg/L	RBSC [b] µg/L	COPC? [c,d]	EPC [e] µg/L
Inorganics - Unfiltered													
Aluminum	4 / 4	100	4.53E+01	J	6.75E+01	J	2.00E+02	2.00E+02	5.42E+01	3.09E+02	3700	N (a)	---
Antimony	1 / 4	25	5.80E+00	J	5.80E+00	J	6.00E+00	1.20E+01	4.45E+00	NA	1.5	Y	5.80E+00
Arsenic	4 / 4	100	5.07E+01		1.10E+02		1.00E+01	2.00E+01	8.29E+01	7.40E+00	0.045	Y	1.10E+02
Barium	4 / 4	100	4.34E+02		9.89E+02		2.00E+02	2.00E+02	7.19E+02	1.18E+04	730	N (b)	---
Calcium	4 / 4	100	2.20E+05		5.90E+05		1.00E+03	2.00E+03	4.07E+05	3.16E+05	Nutrient	N (c)	---
Iron	4 / 4	100	3.22E+02		4.91E+03		3.00E+02	3.00E+02	1.78E+03	1.55E+03	2600	Y	4.91E+03
Magnesium	4 / 4	100	1.55E+05		4.79E+05		5.00E+03	5.00E+03	3.02E+05	2.17E+05	Nutrient	N (c)	---
Manganese	4 / 4	100	3.80E+01		8.57E+02		1.50E+01	1.50E+01	5.37E+02	6.36E+02	88	Y	8.57E+02
Nickel	2 / 4	50	2.80E+00	J	5.80E+00	J	4.00E+01	4.00E+01	1.22E+01	8.60E+00	73	N (a)	---
Potassium	4 / 4	100	5.96E+04		1.29E+05		1.00E+04	2.00E+04	9.69E+04	1.16E+05	Nutrient	N (c)	---
Selenium	3 / 4	75	5.20E+00	J	1.19E+01	J	1.00E+01	2.00E+01	8.35E+00	NA	18	N (a)	---
Sodium	4 / 4	100	5.73E+05		1.47E+06		1.00E+05	5.00E+05	1.06E+06	1.39E+06	Nutrient	N (c)	---
Thallium	1 / 4	25	5.30E+00	J	5.30E+00	J	1.00E+01	1.00E+01	5.08E+00	NA	0.24	Y	5.30E+00
Vanadium	3 / 4	75	1.30E+00	J	2.60E+00	J	5.00E+01	5.00E+01	7.78E+00	NA	18	N (a)	---
Zinc	3 / 3	100	7.70E+00	J	1.60E+01	J	2.00E+01	2.00E+01	1.17E+01	5.01E+02	1100	N (a)	---
Semivolatile Organic Compounds													
3-Methylphenol and 4-Methylphenol	3 / 4	75	9.70E-01	J	9.00E+00	J	4.80E+00	2.00E+01	5.09E+00		93	N (a)	---
Dimethylphenol, 2,4-	4 / 4	100	2.00E+00	J	2.47E+01		4.80E+00	2.00E+01	1.26E+01		73	N (a)	---
Methylnaphthalene, 2-	4 / 4	100	1.45E+01		3.62E+01		4.80E+00	2.00E+01	2.45E+01		15	Y	3.62E+01
Methylphenol, 2-	2 / 4	50	6.20E+00	J	6.90E+00	J	4.80E+00	2.00E+01	4.49E+00		180	N (a)	---
Naphthalene	4 / 4	100	1.18E+01		3.32E+01		4.80E+00	2.00E+01	2.33E+01		0.14	Y	3.32E+01
Phenol	2 / 4	50	6.60E+00	J	6.60E+00	J	4.80E+00	2.00E+01	4.51E+00		1100	N (a)	---
Volatile Organic Compounds													
Acetone	2 / 2	100	1.40E+02	J	4.63E+02	J	2.50E+02	5.00E+02	3.02E+02		2200	N (a)	---
Benzene	4 / 4	100	2.75E+01		1.30E+03		2.00E+00	2.00E+01	5.02E+02		0.41	Y	1.30E+03
Butanone, 2-	3 / 4	75	1.09E+01		2.99E+02		1.00E+01	1.00E+02	9.66E+01		710	N (a)	---
Carbon disulfide	3 / 4	75	1.90E+00	J	1.23E+01	J	4.00E+00	4.00E+01	9.30E+00		100	N (a)	---
Chloroform	2 / 4	50	1.20E+01		1.80E+01		2.00E+00	2.00E+01	1.03E+01		0.19	Y	1.80E+01
Chloromethane	1 / 4	25	2.16E+02		2.16E+02		4.00E+00	4.00E+01	6.20E+01		19	Y	2.16E+02
Ethylbenzene	4 / 4	100	3.09E+01		1.76E+02		2.00E+00	2.00E+01	9.46E+01		1.5	Y	1.76E+02
Methylene chloride	1 / 2	50	2.88E+01	J	2.88E+01	J	1.00E+01	1.00E+02	1.69E+01		4.8	Y	2.88E+01
Tetrachloroethane, 1,1,2,2-	1 / 4	25	5.30E-01	J	5.30E-01	J	2.00E+00	2.00E+01	4.13E+00		0.067	Y	5.30E-01
Toluene	4 / 4	100	4.36E+01		7.30E+02		2.00E+00	2.00E+01	3.33E+02		230	Y	7.30E+02
Xylenes, total	4 / 4	100	3.70E+02		1.34E+03		6.00E+00	6.00E+01	8.11E+02		20	Y	1.34E+03
General Chemistry													
Chloride	4 / 4	100	7.05E+05		4.28E+06		1.00E+05	2.00E+05	2.46E+06		Nutrient	N (c)	---
Cyanide, total	2 / 4	50	3.70E+01	J	1.20E+02	J	1.00E+01	1.00E+01	4.18E+01		73	Y	1.20E+02
Nitrate-Nitrite	2 / 4	50	4.60E+01	J	1.90E+02	J	1.00E+02	2.00E+03	5.59E+02		1,000 [f]	N (a)	---
Sulfate	2 / 4	50	1.36E+04		9.34E+04		2.00E+03	1.00E+05	4.55E+04		250,000 [g]	N (a)	---

Table 3-10

Statistical Summary and Selection of Chemicals of Potential Concern in Bedrock Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works
Sandusky, Ohio

µg/L - Micrograms per liter.
BSC - Background screening concentration.
COPC - Chemical of potential concern.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Shaw Environmental, Inc. (Shaw), 2005, *2004 Groundwater Data Summary and Evaluation Report, Final, Former Plum Brook Ordnance Works, Sandusky, Ohio* , April.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] Exposure point concentration (EPC) used in risk assessment equal to maximum detected concentration.
[f] RBSC for nitrite is used for screening.
[g] EPA, 2009, *2009 Edition of the Drinking Water Standards and Health Advisories* , Office of Water, October, EPA 822-R-09-011.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-11

Statistical Summary and Selection of Chemicals of Potential Concern in Monitoring Well Overburden Groundwater - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	BSC [a] µg/L	RBSC [b] µg/L		COPC? [c,d]	95% UCL [e] µg/L	EPC [f] µg/L
Inorganics-Unfiltered															
Aluminum	6 / 6	100	1.72E+01	J	1.11E+03	J	2.00E+02	2.00E+02	2.48E+02	3.09E+02	3700		N (a)		---
Arsenic	2 / 6	33	5.40E+00	J	6.30E+00	J	1.00E+01	1.00E+01	5.28E+00	7.40E+00	0.045		N (b)		---
Barium	6 / 6	100	2.86E+01	J	2.52E+02		2.00E+02	2.00E+02	9.78E+01	1.18E+04	730		N (a)		---
Calcium	6 / 6	100	9.34E+04		2.82E+05		1.00E+03	1.00E+03	1.73E+05	3.16E+05	Nutrient		N (c)		---
Cobalt	6 / 6	100	1.00E+00	J	2.22E+01	J	5.00E+01	5.00E+01	6.55E+00	1.21E+01	1.1		Y	1.85E+01	1.85E+01
Iron	3 / 6	50	1.09E+03		4.61E+03		3.00E+02	3.00E+02	1.76E+03	1.55E+03	2600		Y	3.86E+03	3.86E+03
Lead	2 / 3	67	2.20E+00	J	4.30E+00	J	5.00E+00	1.00E+01	3.83E+00	NA	15	g	N (a)		---
Magnesium	6 / 6	100	3.87E+04		9.24E+04		5.00E+03	5.00E+03	6.42E+04	2.17E+05	Nutrient		N (c)		---
Manganese	6 / 6	100	1.36E+02		3.23E+04		1.50E+01	1.50E+02	7.00E+03	6.36E+02	88		Y	9.58E+04	3.23E+04
Nickel	6 / 6	100	4.10E+00		1.52E+01	J	4.00E+01	4.00E+01	8.42E+00	8.60E+00	73		N (a)		---
Potassium	6 / 6	100	2.82E+03	J	2.82E+04		1.00E+04	1.00E+04	1.66E+04	1.16E+05	Nutrient		N (c)		---
Selenium	4 / 6	67	3.70E+00	J	5.20E+00	J	1.00E+01	2.00E+01	5.58E+00	NA	18		N (a)		---
Sodium	6 / 6	100	1.89E+04		8.13E+04		1.00E+04	2.00E+04	5.39E+04	1.39E+06	Nutrient		N (c)		---
Thallium	1 / 6	17	3.46E+01		3.46E+01		1.00E+01	2.00E+01	9.93E+00	NA	0.24		Y	3.14E+01	3.14E+01
Vanadium	2 / 6	33	1.20E+00	J	2.90E+00	J	5.00E+01	5.00E+01	1.74E+01	NA	18		N (a)		---
Zinc	3 / 4	75	1.34E+01	J	2.32E+01		2.00E+01	2.00E+01	1.52E+01	5.01E+02	1100		N (a)		---
Nitroaromatics															
Nitrotoluene, 2-	1 / 6	17	1.80E-01	J	1.80E-01	J	1.90E-01	2.00E-01	1.11E-01		0.31		N (a)		---
Nitrotoluene, 4-	1 / 6	17	1.70E-01	J	1.70E-01	J	1.90E-01	2.00E-01	1.09E-01		4.2		N (a)		---
Volatile Organic Compounds															
Chloroform	1 / 6	17	4.80E-01	J	4.80E-01	J	1.00E+00	1.00E+00	4.97E-01		0.19		Y	5.03E-01	4.80E-01
General Chemistry															
Chloride	6 / 6	100	1.15E+04		4.00E+04		2.00E+03	1.00E+04	3.14E+04		Nutrient		N (c)		---
Nitrate-Nitrite	3 / 6	50	4.10E+01	J	1.30E+02	J	1.00E+02	2.00E+03	3.79E+02		1,000	h	N (a)		---
Sulfate	6 / 6	100	1.09E+05		5.89E+05		4.00E+03	2.00E+05	3.47E+05		250,000	i	Y	5.20E+05	5.20E+05

BSC - Background screening concentration.
RBSC - Risk-based screening concentration.
COPC - Chemical of potential concern.
µg/L - Micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Shaw Environmental, Inc. (Shaw), 2005, *2004 Groundwater Data Summary and Evaluation Report, Final, Former Plum Brook Ordnance Works, Sandusky, Ohio*, April.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] Screening criteria for lead based on the action level of 15 µg/L (EPA, 1996, *Drinking Water Regulations and Health Advisories*, Office of Water, Washington, DC, October).
[h] Screening criteria for nitrite.
[i] EPA, 2009, *2009 Edition of the Drinking Water Standards and Health Advisories*, Office of Water, October, EPA 822-R-09-011.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-12

Statistical Summary and Selection of Chemicals of Potential Concern in Sediment - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	RBSC [a] mg/kg	COPC? [b,c]	EPC [d] mg/kg
Inorganics												
Aluminum	4 / 4	100	4.49E+03		9.88E+03		1.30E+01	2.40E+01	7.84E+03	7.70E+04	N (a)	---
Antimony	3 / 4	75	5.00E-01	J	1.30E+00	J	3.80E+00	7.30E+00	1.19E+00	3.10E+01	N (a)	---
Arsenic	4 / 4	100	4.00E+00		1.59E+01		5.10E-01	9.70E-01	9.20E+00	3.90E-01	Y	1.59E+01
Barium	4 / 4	100	3.13E+01		1.10E+02		1.30E+01	2.40E+01	5.86E+01	1.50E+04	N (a)	---
Beryllium	4 / 4	100	3.00E-01	J	1.60E+00		3.20E-01	6.10E-01	7.55E-01	1.60E+02	N (a)	---
Cadmium	4 / 4	100	2.30E-01	J	5.90E-01		2.50E-01	4.80E-01	4.23E-01	7.00E+01	N (a)	---
Calcium	4 / 4	100	1.04E+04		2.99E+04		3.20E+02	6.10E+02	1.77E+04	Nutrient	N (b)	---
Chromium	4 / 4	100	7.80E+00		1.69E+01		6.40E-01	1.20E+00	1.30E+01	2.90E-01	Y	1.69E+01
Cobalt	4 / 4	100	4.40E+00		9.90E+00		3.20E+00	6.10E+00	8.08E+00	2.30E+01	N (a)	---
Copper	4 / 4	100	1.05E+01		3.85E+01		1.60E+00	3.00E+00	2.27E+01	3.10E+03	N (a)	---
Iron	4 / 4	100	9.27E+03		2.17E+04		6.40E+00	1.20E+01	1.79E+04	5.50E+04	N (a)	---
Lead	4 / 4	100	7.00E+00	J	2.37E+01		6.40E+00	1.20E+01	1.67E+01	4.00E+02	N (a)	---
Magnesium	4 / 4	100	1.81E+03		9.37E+03		3.20E+02	6.10E+02	5.13E+03	Nutrient	N (b)	---
Manganese	4 / 4	100	1.65E+02		1.67E+03		1.10E+00	9.10E+00	6.55E+02	1.80E+03	N (a)	---
Mercury	4 / 4	100	2.10E-02	J	1.40E-01		1.00E-01	2.00E-01	7.38E-02	2.30E+01	N (a)	---
Nickel	4 / 4	100	1.20E+01		2.67E+01		2.50E+00	4.80E+00	2.14E+01	1.50E+03	N (a)	---
Potassium	4 / 4	100	7.25E+02	J	1.74E+03		6.40E+02	1.20E+03	1.24E+03	Nutrient	N (b)	---
Selenium	3 / 4	75	3.20E-01	J	1.30E+00	J	6.40E+00	1.20E+01	1.44E+00	3.90E+02	N (a)	---
Silver	1 / 4	25	9.90E-02	J	9.90E-02	J	6.40E-01	1.20E+00	3.49E-01	3.90E+02	N (a)	---
Sodium	2 / 4	50	8.31E+01	J	1.12E+02	J	6.40E+02	1.20E+03	2.79E+02	Nutrient	N (b)	---
Vanadium	4 / 4	100	1.24E+01		2.55E+01		3.20E+00	6.10E+00	1.98E+01	3.90E+02	N (a)	---
Zinc	4 / 4	100	3.33E+01		1.37E+02		1.30E+00	2.40E+00	7.86E+01	2.30E+04	N (a)	---
Polychlorinated Biphenyls												
Aroclor 1254	2 / 4	50	2.50E-02	J	3.52E-02	J	2.20E-02	4.10E-02	2.11E-02	1.10E-01	N (a)	---
Aroclor 1260	2 / 4	50	2.07E-02	J	1.13E-01	J	2.20E-02	4.10E-02	3.94E-02	2.20E-01	N (a)	---
Semivolatiles Organic Compounds												
Benzo(a)anthracene	1 / 4	25	1.21E-01	J	1.21E-01	J	2.20E-01	1.10E+00	2.28E-01	1.50E-01	N (a)	---
Benzo(a)pyrene	1 / 4	25	1.12E-01	J	1.12E-01	J	2.20E-01	1.10E+00	2.26E-01	1.50E-02	Y	1.12E-01
Benzo(b)fluoranthene	1 / 4	25	1.75E-01	J	1.75E-01	J	2.20E-01	1.10E+00	2.41E-01	1.50E-01	Y	1.75E-01
Chrysene	1 / 4	25	1.49E-01	J	1.49E-01	J	2.20E-01	1.10E+00	2.35E-01	1.50E+01	N (a)	---
Dibenzofuran	1 / 4	25	1.50E-01	J	1.50E-01	J	2.20E-01	1.10E+00	2.35E-01	7.80E+01	N (a)	---
Di-n-butyl phthalate	1 / 4	25	1.80E-01	J	1.80E-01	J	4.30E-01	2.20E+00	4.90E-01	6.10E+03	N (a)	---
Fluoranthene	1 / 4	25	1.91E-01	J	1.91E-01	J	2.20E-01	1.10E+00	2.45E-01	2.30E+03	N (a)	---
Methylnaphthalene, 2-	1 / 4	25	6.16E-01		6.16E-01		2.20E-01	1.10E+00	3.52E-01	3.10E+02	N (a)	---
Naphthalene	1 / 4	25	3.37E-01	J	3.37E-01	J	2.20E-01	1.10E+00	2.82E-01	3.60E+00	N (a)	---
Phenanthrene	1 / 4	25	3.06E-01	J	3.06E-01	J	2.20E-01	1.10E+00	2.74E-01	1.70E+02 e	N (a)	---
Pyrene	1 / 4	25	1.95E-01	J	1.95E-01	J	2.20E-01	1.10E+00	2.46E-01	1.70E+02	N (a)	---

Table 3-12

Statistical Summary and Selection of Chemicals of Potential Concern in Sediment - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

COPC - Chemical of potential concern.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil and are based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = essential nutrient.
[c] Y = Chemical is chosen as COPC.
[d] Exposure point concentration (EPC) used in risk assessment equal to maximum detected concentration.
[e] RBSC based on pyrene.

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-13

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Water - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Conc Minimum	VQ	Detected Conc Maximum	VQ	Reporting Limits Minimum	Reporting Limits Maximum	Arithmetic Mean µg/L	RBSC [a] µg/L		COPC? [b,c]
Metals												
Aluminum	4 / 4	100	31.8	J	8770		200	200	2.23E+03	3.70E+04		N (a)
Arsenic	1 / 4	25	8.3	J	8.3	J	10	10	5.83E+00	4.50E-02		Y
Barium	4 / 4	100	31.9	J	80	J	200	200	4.56E+01	7.30E+03		N (a)
Calcium	4 / 4	100	139000		222000		1000	1000	1.62E+05	Nutrient		N (b)
Chromium	1 / 4	25	13.9		13.9		10	10	7.23E+00	4.30E-02		Y
Cobalt	1 / 4	25	6.9	J	6.9	J	50	50	2.05E+01	1.10E+01		N (a)
Copper	1 / 4	25	19.2	J	19.2	J	25	25	1.42E+01	1.50E+03		N (a)
Iron	3 / 4	75	26.6	J	15100		300	300	3.83E+03	2.60E+04		N (a)
Lead	3 / 4	75	2	J	15		10	10	6.03E+00	1.50E+01	d	N (a)
Magnesium	4 / 4	100	26200		36900		5000	5000	2.90E+04	Nutrient		N (b)
Manganese	4 / 4	100	247		836		15	15	4.92E+02	8.80E+02		N (a)
Nickel	1 / 4	25	26.2	J	26.2	J	40	40	2.16E+01	7.30E+02		N (a)
Potassium	4 / 4	100	2030	J	11800		10000	10000	4.51E+03	Nutrient		N (b)
Sodium	4 / 4	100	6400	J	9140	J	10000	10000	7.36E+03	Nutrient		N (b)
Vanadium	1 / 4	25	20	J	20	J	50	50	2.38E+01	1.80E+02		N (a)
Zinc	4 / 4	100	9.6	J	93.2		20	20	3.17E+01	1.10E+04		N (a)

µg/L - Micrograms per liter.
COPC - Chemical of potential concern.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values are based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = essential nutrient.
[c] Y = Chemical is chosen as COPC.
[d] Screening criteria for lead based on the action level of 15 µg/L (EPA, 2009, *Drinking Water Regulations and Health Advisories* , Office of Water, Washington, DC, October, EPA 822-R-09-011).

Source: Ash Pit No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-14

Summary of Human Health Risks/Hazards for All Receptors - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Current/Future Groundskeeper [a]		Current/Future Construction Worker		Future Indoor Worker		Future Resident[b]			Future Hunter		Future Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Assuming Bedrock Groundwater Use													
Exposure Media													
Surface Soil	5.25E-06	0.21	NE	NE	1.23E-06	0.008	NE	NE	NE	3.07E-07	0.0009	NA	NA
Total Soil[c]	2.08E-06	0.19	1.15E-07	0.67	NE	NE	4.83E-06	0.02	0.19	NE	NE	NE	NE
Groundwater[d]	***8.48E-04***	***9***	NE	NE	***8.48E-04***	***9***	***6.48E-03***	***58***	***134***	NE	NE	NE	NE
Sediment	NE	NE	6.30E-07	0.19	NE	NE	3.94E-06	0.007	0.07	NE	NE	NE	NE
Surface Water	NE	NE	1.15E-08	0.01	NE	NE	2.68E-07	0.003	0.006	NE	NE	NE	NE
Total across all media [d]	9.E-04	9	8.E-07	0.9	***8.E-04***	***9***	***6.E-03***	58	***135***	3.E-07	0.0009	NA	NA

	Groundskeeper [a]		Construction Worker		Indoor Worker		Resident[b]			Hunter		Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Assuming Overburden Groundwater Use													
Exposure Media													
Surface Soil	5.25E-06	0.21	NE	NE	1.23E-06	0.008	NE	NE	NE	3.07E-07	0.0009	NA	NA
Total Soil[c]	2.08E-06	0.19	1.15E-07	0.67	NE	NE	4.83E-06	0.02	0.19	NE	NE	NE	NE
Groundwater[†]	NA	***12.7***	NE	NE	NA	***12.7***	NA	***35***	***82***	NE	NE	NE	NE
Sediment	NE	NE	6.30E-07	0.19	NE	NE	3.94E-06	0.007	0.07	NE	NE	NE	NE
Surface Water	NE	NE	1.15E-08	0.01	NE	NE	2.68E-07	0.003	0.006	NE	NE	NE	NE
Total across all media [d]	5.E-06	13	8.E-07	0.9	1.E-06	***12.7***	9.E-06	***35***	***82***	3.E-07	0.0009	NA	NA
Total across all media except groundwater [e]	5.E-06[f]	0.2[f]	8.E-07	0.9	1.E-06	0.008	9.E-06	0.03	0.3	3.E-07	0.0009	NA	NA

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.
RI - Remedial investigation.

[a]Total ILCR and total HI values for the groundskeeper reflect the respective totals for the future groundskeeper assumed to use either bedrock or overburden groundwater. The total ILCR and HI values for the current groundskeeper are simply those shown for soil. The rounded current groundskeeper ILCR is 5E-6 and the rounded HI is 0.2.
[b]The BHHRA includes both childhood and adult resident exposure scenarios. For noncancer effects, the HI values for childhood exposure and adult exposure are shown separately.
The Total ILCR is the summed ILCR values for both child and adult scenarios which, unlike noncancer HI values, are regarded as additive throughout the lifetime of an individual.
[c]The HI values for total soil do not include the contribution of manganese that were quantified in the BHHRA because manganese was determined upon further evaluation to be resultant from ambient background conditions.
[d]Exposure to groundwater was assumed for potable use. Based on poor natural quality and limited yield, use of groundwater is regarded as implausible.
[e]Groundwater is excluded because based on poor natural quality and limited yield, use of groundwater is regarded as implausible.
[†]For soil exposure, either surface soil or subsurface soil exposure was assumed in this sum, whichever would lead to a higher Total HI or Total ILCR. Summed totals are rounded to one significant figure.

Notes:
1. *Italics* (non-bolded) apply only to cancer risks and indicate that the value exceeds the 1E-5 PBOW Project Delivery Team goal.
2. ***Bold italics*** indicates that the noncancer hazard is unacceptable, or that the cancer risk value exceeds the NCP acceptable range (1E-6 to 1E-4).

Source: Ash Pit No.1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2011).

Table 3-15

Statistical Summary and COPEC Selection for Chemicals Detected in Soil (0 to 6 feet bgs) - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]	Distribution [e]	95% UCL [e] (mg/kg)	EPC [f] (mg/kg)	UCL 0-1' soil depth [g] (mg/kg)	MDC 0-1' soil depth [g] (mg/kg)	EPC 0-1' soil depth [g] (mg/kg)
Inorganics																		
Aluminum	22 / 22	100	2.77E+03		1.66E+04		3.31E+00	4.89E+01	9.19E+03	1.55E+04	pH Dependent	N (d)			---			---
Antimony	7 / 22	32	2.58E-01	J	8.38E-01		4.23E-01	2.60E+00	4.76E-01	9.30E+00	0.27	N (b)			---			---
Arsenic	22 / 22	100	3.57E+00		3.12E+01		8.46E-01	2.60E+00	1.07E+01	3.65E+01	18	N (b)			---			---
Barium	22 / 22	100	1.30E+01		1.68E+02		1.65E-01	4.89E+01	8.32E+01	8.26E+02	330	N (a)			---			---
Beryllium	17 / 22	77	1.50E+00		1.65E+01	J	1.65E-01	1.20E+00	7.00E+00	1.00E+00	21	N (a)			---			---
Cadmium	4 / 22	18	2.60E-01	J/U	3.45E-01	J	2.50E-01	6.10E-01	2.43E-01		0.36	N (a)			---			---
Calcium	22 / 22	100	2.68E+03		5.91E+04		4.72E+00	1.22E+03	1.83E+04	5.23E+04	Nutrient	N (c)			---			---
Chromium	22 / 22	100	5.51E+00		2.07E+01		4.13E-01	1.30E+00	1.31E+01	2.90E+01	26	N (a)			---			---
Cobalt	21 / 22	95	3.23E+00		2.79E+01		1.65E-01	1.22E+01	1.01E+01	1.16E+02	13	N (b)			---			---
Copper	22 / 22	100	7.71E+00		5.00E+01		4.13E-01	6.10E+00	2.52E+01	5.62E+01	28	N (b)			---			---
Iron	22 / 22	100	1.06E+04		9.51E+04		3.31E+00	2.62E+01	4.29E+04	2.34E+05	pH Dependent	N (b)			---			---
Lead	22 / 22	100	4.90E+00		2.71E+01		3.80E-01	7.90E-01	9.70E+00	4.86E+01	11	N (b)			---			---
Magnesium	21 / 22	95	6.51E+02		1.65E+04		1.65E+00	1.22E+03	4.76E+03	1.04E+04	Nutrient	N (c)			---			---
Manganese	22 / 22	100	1.25E+02		2.81E+03		1.65E-01	3.90E+00	5.71E+02	3.51E+03	220	N (b)			---			---
Mercury	12 / 22	55	1.24E-02	J	3.83E-01		2.12E-02	2.40E-01	6.76E-02	8.50E-02	0.00051	Y	Gamma	9.35E-02	9.35E-02	1.39E-01	3.83E-01	1.39E-01
Nickel	13 / 22	59	1.71E+00		7.92E+01		2.48E-01	9.80E+00	1.34E+01	5.51E+01	38	N (d)			---			---
Potassium	20 / 22	91	1.64E+02		1.72E+03		2.07E+01	1.22E+03	8.84E+02	3.39E+03	Nutrient	N (c)			---			---
Selenium	11 / 22	50	4.97E-01	J/U	2.70E+00		6.30E-01	1.30E+00	7.79E-01	2.00E+00	0.52	Y	Nonparametric	1.06E+00	1.06E+00	1.36E+00	2.70E+00	1.36E+00
Sodium	16 / 22	73	2.50E+01		1.65E+02		8.26E+00	1.22E+03	1.77E+02		Nutrient	N (c)			---			---
Thallium	8 / 22	36	2.39E-01	J	5.63E-01		4.23E-01	2.60E+00	4.59E-01	1.30E+00	1	N (a)			---			---
Vanadium	22 / 22	100	1.44E+01		3.92E+01		1.65E-01	1.31E+01	2.40E+01	4.09E+01	7.8	N (b)			---			---
Zinc	20 / 22	91	2.31E+01		9.58E+01		2.07E+00	5.20E+00	5.56E+01	3.22E+02	46	N (b)			---			---
Polychlorinated biphenyls (PCB)																		
Aroclor 1260	1 / 13	8	1.03E-01	/U	1.03E-01	/U	4.00E-02	2.69E-01	1.04E-01		0.371	N (a)			---			---
Semivolatile Organic Compounds																		---
Acenaphthylene	1 / 22	4.5	2.79E-01	JJ	2.79E-01	JJ	3.86E-01	2.37E+00	2.76E-01		29	N (a)			---			---
Anthracene	1 / 22	4.5	2.16E-01	JJ	2.16E-01	JJ	3.86E-01	2.37E+00	2.73E-01		29	N (a)			---			---
Benzo(a)anthracene	2 / 22	9	6.42E-02	J	8.56E-01	JJ	3.86E-01	2.37E+00	2.94E-01		1.1	N (a)			---			---
Benzo(a)pyrene	2 / 22	9	5.34E-02	J	7.21E-01	JJ	3.86E-01	2.37E+00	2.88E-01		1.1	N (a)			---			---
Benzo(b)fluoranthene	2 / 22	9	8.29E-02	J	1.21E+00	JJ	3.86E-01	2.37E+00	3.11E-01		1.1	Y	Nonparametric	4.58E-01	4.58E-01	8.29E-01	1.21E+00	8.29E-01
Chrysene	2 / 22	9	6.75E-02	J	8.50E-01	JJ	3.86E-01	2.37E+00	2.94E-01		1.1	N (a)			---			---
Dibenzofuran	1 / 22	4.5	7.57E-02	QJ	7.57E-02	QJ	3.86E-01	2.37E+00	3.02E-01		NSV	N (e)			---			---
Fluoranthene	3 / 22	14	4.77E-02	QJ	1.88E+00	JJ	3.86E-01	2.37E+00	3.36E-01		1.1	Y	Normal	3.56E-01	3.56E-01	1.10E+00	1.88E+00	1.10E+00
Indeno(1,2,3-cd)pyrene	2 / 22	9	3.12E-01	J	1.82E+00	JJ	3.86E-01	2.37E+00	3.49E-01		1.1	Y	Nonparametric	7.10E-01	7.10E-01	1.03E+00	1.82E+00	1.03E+00
Methylnaphthalene, 2-	2 / 22	9	3.63E-01	QJ	9.42E-01	J	3.86E-01	2.37E+00	3.04E-01		3.24	N (a)			---			---
Naphthalene	5 / 22	23	5.53E-02	J	7.64E-01	J	3.86E-01	2.37E+00	2.58E-01		29	N (a)			---			---
Phenanthrene	5 / 22	23	5.50E-02	J	8.31E-01	JJ	3.86E-01	2.37E+00	2.39E-01		29	N (a)			---			---
Pyrene	3 / 22	14	3.78E-02	QJ	1.32E+00	JJ	3.86E-01	2.37E+00	3.10E-01		1.1	Y	Normal	2.60E-01	2.60E-01	7.75E-01	1.32E+00	7.75E-01

bgs - Below ground surface.
BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
mg/kg - Milligrams per kilogram.
RI - Remedial investigation.
VQ - Validation qualifier (a "/" indicates combined VQs for a regular and field duplicate sample pair):
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
Q - Data is biased high due to a calibration error.
U - Not detected.
NSV - No screening value.
UCL - Upper confidence limit.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
(d) - Statistical test shows background and site data to be the same; see Appendix C.
(e) - Infrequently detected (fewer than 5 percent of all samples)
[d] Y - Chemical is chosen as COPEC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (U.S. Environmental Protection Agency (EPA), 2010, ProUCL Version 4.00.05, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/software.htm.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] The EPC for the COPEC at the 0-1 feet soil depth range is used as the exposure concentration for some ecological receptors. Two samples (AP0001 and AP0017) with an end depth slightly greater than 1 foot were also used. See text for details.

Source: Ash Pit No.1 Screening-Level Ecological Risk Assessment (SLERA) (Shaw, 2011).

Table 3-16

Statistical Summary and COPEC Selection for Chemicals Detected in Surface Water - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of values, µg/L: Detected Conc Minimum	VQ	Detected Conc Maximum	VQ	Reporting Limits Minimum	Reporting Limits Maximum	Arithmetic Mean µg/L	ESV [a] µg/L	COPEC? [b,c]	EPC [d] µg/L
Metals												
Aluminum	4 / 4	100	31.8	J	8770		200	200	2.23E+03	8.70E+01	Y	8.77E+03
Arsenic	1 / 4	25	8.3	J	8.3	J	10	10	5.83E+00	3.10E+00	Y	8.30E+00
Barium	4 / 4	100	31.9	J	80	J	200	200	4.56E+01	4.00E+00	Y	8.00E+01
Calcium	4 / 4	100	139000		222000		1000	1000	1.62E+05	Nutrient	N (b)	---
Chromium	1 / 4	25	13.9		13.9		10	10	7.23E+00	4.20E+01	N (a)	---
Cobalt	1 / 4	25	6.9	J	6.9	J	50	50	2.05E+01	2.30E+01	N (a)	---
Copper	1 / 4	25	19.2	J	19.2	J	25	25	1.42E+01	1.58E+00	Y	1.92E+01
Iron	3 / 4	75	26.6	J	15100		300	300	3.83E+03	1000/Nutrient	N (b)	---
Lead	3 / 4	75	2	J	15		10	10	6.03E+00	1.17E+00	Y	1.50E+01
Magnesium	4 / 4	100	26200		36900		5000	5000	2.90E+04	Nutrient	N (b)	---
Manganese	4 / 4	100	247		836		15	15	4.92E+02	1.20E+02	Y	8.36E+02
Nickel	1 / 4	25	26.2	J	26.2	J	40	40	2.16E+01	2.89E+01	N (a)	---
Potassium	4 / 4	100	2030	J	11800		10000	10000	4.51E+03	Nutrient	N (b)	---
Sodium	4 / 4	100	6400	J	9140	J	10000	10000	7.36E+03	Nutrient	N (b)	---
Vanadium	1 / 4	25	20	J	20	J	50	50	2.38E+01	1.20E+01	Y	2.00E+01
Zinc	4 / 4	100	9.6	J	93.2		20	20	3.17E+01	6.57E+01	Y	9.32E+01

µg/L - Micrograms per liter.
COPEC - Chemical of potential ecological concern
EPC - Exposure point concentration
ESV - Ecological screening value
RI - Remedial Investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] ESVs and their sources are in Appendix B.
[b] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPEC.
[d] Due to the small sample size (i.e., < 5 samples), the maximum detected concentration is selected as the EPC.

Source: Ash Pit No.1 Screening-Level Ecological Risk Assessment (SLERA) (Shaw, 2011).

Table 3-17

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	ESV [b] mg/kg	COPEC? [c,d]	EPC [e] mg/kg
Inorganics													
Aluminum	4 / 4	100	4.49E+03		9.88E+03		1.30E+01	2.40E+01	7.84E+03	1.55E+04	NSV	N (b)	---
Antimony	3 / 4	75	5.00E-01	J	1.30E+00	J	3.80E+00	7.30E+00	1.19E+00	9.30E+00	NSV	N (b)	---
Arsenic	4 / 4	100	4.00E+00		1.59E+01		5.10E-01	9.70E-01	9.20E+00	3.65E+01	9.79E+00	N (b)	---
Barium	4 / 4	100	3.13E+01		1.10E+02		1.30E+01	2.40E+01	5.86E+01	8.26E+02	NSV	N (b)	---
Beryllium	4 / 4	100	3.00E-01	J	1.60E+00		3.20E-01	6.10E-01	7.55E-01	1.00E+00	NSV	Y	1.60E+00
Cadmium	4 / 4	100	2.30E-01	J	5.90E-01		2.50E-01	4.80E-01	4.23E-01	NA	9.90E-01	N (a)	---
Calcium	4 / 4	100	1.04E+04		2.99E+04		3.20E+02	6.10E+02	1.77E+04	5.23E+04	Nutrient	N (c)	---
Chromium	4 / 4	100	7.80E+00		1.69E+01		6.40E-01	1.20E+00	1.30E+01	2.90E+01	4.34E+01	N (a)	---
Cobalt	4 / 4	100	4.40E+00		9.90E+00		3.20E+00	6.10E+00	8.08E+00	1.16E+02	5.00E+01	N (a)	---
Copper	4 / 4	100	1.05E+01		3.85E+01		1.60E+00	3.00E+00	2.27E+01	5.62E+01	3.16E+01	N (b)	---
Iron	4 / 4	100	9.27E+03		2.17E+04		6.40E+00	1.20E+01	1.79E+04	2.34E+05	Nutrient	N (c)	---
Lead	4 / 4	100	7.00E+00	J	2.37E+01		6.40E+00	1.20E+01	1.67E+01	4.86E+01	3.58E+01	N (a)	---
Magnesium	4 / 4	100	1.81E+03		9.37E+03		3.20E+02	6.10E+02	5.13E+03	1.04E+04	Nutrient	N (c)	---
Manganese	4 / 4	100	1.65E+02		1.67E+03		1.10E+00	9.10E+00	6.55E+02	3.51E+03	4.60E+02	N (b)	---
Mercury	4 / 4	100	2.10E-02	J	1.40E-01		1.00E-01	2.00E-01	7.38E-02	8.50E-02	1.80E-01	N (a)	---
Nickel	4 / 4	100	1.20E+01		2.67E+01		2.50E+00	4.80E+00	2.14E+01	5.51E+01	2.27E+01	N (b)	---
Potassium	4 / 4	100	7.25E+02	J	1.74E+03		6.40E+02	1.20E+03	1.24E+03	3.39E+03	Nutrient	N (c)	---
Selenium	3 / 4	75	3.20E-01	J	1.30E+00	J	6.40E+00	1.20E+01	1.44E+00	2.00E+00	NSV	N (b)	---
Silver	1 / 4	25	9.90E-02	J	9.90E-02	J	6.40E-01	1.20E+00	3.49E-01	1.11E+01	5.00E-01	N (a)	---
Sodium	2 / 4	50	8.31E+01	J	1.12E+02	J	6.40E+02	1.20E+03	2.79E+02	NA	Nutrient	N (c)	---
Vanadium	4 / 4	100	1.24E+01		2.55E+01		3.20E+00	6.10E+00	1.98E+01	4.09E+01	NSV	N (b)	---
Zinc	4 / 4	100	3.33E+01		1.37E+02		1.30E+00	2.40E+00	7.86E+01	3.22E+02	1.21E+02	N (b)	---
Polychlorinated Biphenyls													
Aroclor 1254	2 / 4	50	2.50E-02	J	3.52E-02	J	2.20E-02	4.10E-02	2.11E-02		5.98E-02	N (a)	---
Aroclor 1260	2 / 4	50	2.07E-02	J	1.13E-01	J	2.20E-02	4.10E-02	3.94E-02		5.98E-02	Y	1.13E-01
Semivolatiles Organic Compounds													
Benzo(a)anthracene	1 / 4	25	1.21E-01	J	1.21E-01	J	2.20E-01	1.10E+00	2.28E-01		1.08E-01	Y	1.21E-01
Benzo(a)pyrene	1 / 4	25	1.12E-01	J	1.12E-01	J	2.20E-01	1.10E+00	2.26E-01		1.50E-01	N (a)	---
Benzo(b)fluoranthene	1 / 4	25	1.75E-01	J	1.75E-01	J	2.20E-01	1.10E+00	2.41E-01		1.04E+01	N (a)	---
Chrysene	1 / 4	25	1.49E-01	J	1.49E-01	J	2.20E-01	1.10E+00	2.35E-01		1.66E-01	N (a)	---
Dibenzofuran	1 / 4	25	1.50E-01	J	1.50E-01	J	2.20E-01	1.10E+00	2.35E-01		4.49E-01	N (a)	---
Di-n-butyl phthalate	1 / 4	25	1.80E-01	J	1.80E-01	J	4.30E-01	2.20E+00	4.90E-01		1.11E+00	N (a)	---
Fluoranthene	1 / 4	25	1.91E-01	J	1.91E-01	J	2.20E-01	1.10E+00	2.45E-01		4.23E-01	N (a)	---
Methylnaphthalene, 2-	1 / 4	25	6.16E-01		6.16E-01		2.20E-01	1.10E+00	3.52E-01		2.02E-02	Y	6.16E-01
Naphthalene	1 / 4	25	3.37E-01	J	3.37E-01	J	2.20E-01	1.10E+00	2.82E-01		1.76E-01	Y	3.37E-01
Phenanthrene	1 / 4	25	3.06E-01	J	3.06E-01	J	2.20E-01	1.10E+00	2.74E-01		2.04E-01	Y	3.06E-01
Pyrene	1 / 4	25	1.95E-01	J	1.95E-01	J	2.20E-01	1.10E+00	2.46E-01		1.95E-01	Y	1.95E-01

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.

Table 3-17

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
NSV - No screening value available.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] Soil background screening concentrations are used for sediment. See text for details.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPEC.
[e] Due to the small sample size (i.e., < 5 samples), the maximum detected concentration is selected as the EPC.

Source: Ash Pit No.1 Screening-Level Ecological Risk Assessment (SLERA) (Shaw, 2011).

Table 3-18

Ecological Hazard Quotients for All Assessment Receptors - AP1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

COPEC	Deer Mouse		Short-tailed Shrew		Cottontail Rabbit		Marsh Wren		White-tailed Deer		Raccoon		Red-tailed Hawk		Muskrat	
	NOAEL[a]	LOAEL[b]	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Metals																
Aluminum	6.75E-01	6.75E-02	6.97E-01	6.97E-02	1.15E-01	1.15E-02	2.15E-02	2.15E-03	4.66E-04	4.66E-05	2.08E-02	2.08E-03	4.57E-06	4.57E-07	4.26E-01	4.26E-02
Arsenic	9.79E-03	9.79E-04	1.01E-02	1.01E-03	1.67E-03	1.67E-04	4.36E-04	1.75E-04	6.75E-06	6.75E-07	8.96E-05	8.96E-06	9.25E-08	3.70E-08	6.17E-03	6.17E-04
Barium	2.33E-03	6.01E-04	2.41E-03	6.20E-04	3.98E-04	1.03E-04	1.04E-03	5.18E-04	1.61E-06	4.14E-07	1.90E-05	4.89E-06	2.20E-07	1.10E-07	1.47E-03	3.79E-04
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.26E-04	1.65E-04	NA	NA	3.75E-01	7.51E-02
Copper	2.44E-04	1.89E-04	2.52E-04	1.94E-04	4.16E-05	3.22E-05	1.10E-04	8.40E-05	1.68E-07	1.30E-07	1.12E-05	8.69E-06	2.34E-08	1.78E-08	1.54E-04	1.19E-04
Lead	2.79E-04	2.79E-05	2.88E-04	2.88E-05	4.76E-05	4.76E-06	3.58E-03	3.58E-04	1.92E-07	1.92E-08	1.45E-06	1.45E-07	2.23E-07	2.23E-08	1.76E-04	1.76E-05
Manganese	1.41E-03	4.38E-04	1.46E-03	4.51E-04	2.41E-04	7.47E-05	2.31E-04	2.31E-05	9.73E-07	3.02E-07	1.66E-05	5.14E-06	4.90E-08	4.90E-09	8.90E-04	2.76E-04
Mercury	4.37E-03	4.30E-04	5.69E-03	5.60E-04	2.31E-04	2.27E-05	3.65E-01	1.83E-01	4.11E-07	4.04E-08	5.39E-05	1.08E-05	3.75E-06	1.88E-06	0.00E+00	0.00E+00
Selenium	8.64E-01	5.24E-01	7.90E-01	4.79E-01	8.82E-02	5.35E-02	6.88E-01	3.44E-01	1.44E-04	8.73E-05	7.92E-04	4.80E-04	9.98E-05	2.93E-05	0.00E+00	0.00E+00
Vanadium	1.42E-02	1.42E-03	1.46E-02	1.46E-03	2.42E-03	2.42E-04	4.75E-04	4.75E-05	9.76E-06	9.76E-07	2.66E-04	2.66E-05	1.01E-07	1.01E-08	8.92E-03	8.92E-04
Zinc	8.66E-05	4.33E-05	8.93E-05	4.47E-05	1.48E-05	7.39E-06	1.74E-03	1.92E-04	5.97E-08	2.98E-08	4.01E-06	2.00E-06	3.68E-07	4.07E-08	5.46E-05	2.73E-05
PCBs																
Aroclor 1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-04	3.16E-05	0.00E+00	0.00E+00	3.19E-04	3.19E-05
Semivolatile Organics																
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-05	1.34E-05	0.00E+00	0.00E+00	2.04E-02	4.07E-03
Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-05	1.23E-06	0.00E+00	0.00E+00	5.70E-03	5.70E-04
Benzo(b)fluoranthene	1.14E-02	2.28E-03	5.27E-03	1.05E-03	1.71E-03	3.42E-04	3.95E-01	7.90E-02	1.94E-06	3.87E-07	9.61E-06	1.92E-06	6.78E-06	1.36E-06	0.00E+00	0.00E+00
Fluoranthene	8.46E-02	8.46E-03	1.64E-02	1.64E-03	1.37E-02	1.37E-03	1.86E-03	1.86E-04	9.48E-06	9.48E-07	6.26E-05	6.26E-06	3.19E-08	3.19E-09	0.00E+00	0.00E+00
Indeno(1,2,3-cd)pyrene	7.77E-03	1.55E-03	8.88E-03	1.78E-03	5.50E-04	1.10E-04	1.59E-01	3.18E-02	6.57E-07	1.31E-07	8.49E-06	1.70E-06	1.18E-06	2.37E-07	0.00E+00	0.00E+00
Napthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-05	4.38E-06	0.00E+00	0.00E+00	8.62E-02	1.72E-02
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-06	1.61E-06	0.00E+00	0.00E+00	2.37E-02	4.74E-03
Pyrene	1.24E-02	2.48E-03	2.82E-03	5.63E-04	1.79E-03	3.58E-04	2.67E-03	2.67E-04	1.31E-06	2.63E-07	1.24E-05	2.47E-06	2.25E-08	2.25E-09	5.61E-03	1.12E-03

COPEC - Chemical of potential ecological concern.
LOAEL - Lowest-observed-adverse-effect level.
NA - No toxicity data available; hazard quotients not calculated.
NOAEL - No-observed-adverse-effect level.
RI - Remedial investigation.

[a]Ecological hazard quotient (EHQ) value is based on the more-stringent NOAEL toxicity value.
[b]EHQ value is based on the less-stringent LOAEL toxicity value.

Notes:
1. EHQ values that are 1 or less reflect a minimal potential for adverse ecological effects. HQ values greater than 1 to but not exceeding 10 indicate a low potential for adverse ecological effects, and those ranging from 10 through 100 are regarded as having a significant potential for adverse ecological effects. Values greater than 100 have the highest potential for adverse ecological effects.
2. All AP1 EHQ values are less than a value of 1, indicating only a minimal potential for adverse ecological effects.

Source: Ash Pit No.1 Screening-Level Ecological Risk Assessment (SLERA) (Shaw, 2011).

Table 4-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - CY1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

				LOCATION	CY1-SB01						CY1-SB02						CY1-SB03									
				SAMPLE NO	CY0001		CY0002		CY0003		CY0004		CY0005		CY0006		CY0007		CY0008		CY0009		CY0010		CY0011	
				DATE	12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011	
				DEPTH	0.5 - 1.5 Ft		3 - 5 Ft		8 - 10 Ft		0.3 - 1.3 Ft		3 - 5 Ft		8 - 10 Ft		0.5 - 1.5 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-	-	-	0.103	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	-	-	-	-	-	-	-	-	0.138	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-	-	-	0.105	J	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	-	-	-	-	-	-	-	-	-	-	-	-	0.0264	J	-	-	-	-	0.025		-	-
Naphthalene	mg/kg	3.6	NE	0.183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02		-	-
Phenanthrene	mg/kg	NE	NE	0.0255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009		-	-
Pyrene	mg/kg	170	NE	0.124	-	-	-	-	-	-	-	-	0.124	J	-	-	-	-	-	-	-	-	-	-	-	-
METALS																										
Aluminum	mg/kg	7,700	15,500	13,100	4,660		10,100		11,000		2,030		6,020		9,910		5,020		11,400		13,100		10000		6,900	
Antimony	mg/kg	3.1	9.3	1.4	0.12	J	-	-	-	-	0.14	J	0.23	J	-	-	-	-	-	-	-	-	1.4	J	-	-
Arsenic	mg/kg	0.39	36.5	34.6	3.1		7.9		8.4		34.6		3.8		7		9		12.5		10.1		19		5.9	
Barium	mg/kg	1,500	826	100	18.5		73.8		79.7		23.9		44		62.7		31.6		84.6		79.8		100		53.6	
Beryllium	mg/kg	16	1	0.67	0.24	J	0.52		0.58		0.061	J	0.5		0.62	J	0.32		0.63		0.67		0.51		0.36	
Cadmium	mg/kg	7	NE	0.8	-	-	0.15	J	0.33	J	-	-	0.52		0.46	J	0.17	J	0.33	J	0.38	J	-	-	-	-
Calcium	mg/kg	NE	52,300	50,000	727		5,470		13,800		447		4,140		3,230		2,340		3,110		2,910		2,600		50,000	
Chromium	mg/kg	NE	29	20.1	7.8		15.4		17.1		3.9		10.7		15.3		8.7		17.8		20.1		18		14.5	
Cobalt	mg/kg	2.3	116	18	3.1		8.3		18		0.79	J	9.5		14.1		3.3		14.1		15.7		11		6.4	
Copper	mg/kg	310	56.2	30	6		19.4		24.9		3.3		18.3		18.1		7.5		24.8		26.7		30		17.6	
Iron	mg/kg	5,500	234,000	43,000	8,320		18,800		22,300		7,840		17,300		17,100		12,700		26,000		20,700		43,000		13,200	
Lead	mg/kg	40	48.6	29.8	4.8		10.7		11.8		5.5		29.8		10.3		7.2		12.8		10.6		14		12.5	
Magnesium	mg/kg	NE	10,400	12,500	614		3,710		6,100		274		1,180		2,260		1,090		3,950		3,710		3,100	B	**12,500**	
Manganese	mg/kg	180	3,506	721	30.6		316		721		23.7		188		401		148		230	J	461	J	290		249	
Mercury	mg/kg	1	0.09	0.076	0.013	J	0.021	J	0.019	J	0.022	J	0.037	J	0.076	J	0.034	J	0.02	J	0.031	J	0.022	J	0.015	J
Nickel	mg/kg	150	55.1	39	7.8		23.1		36		2.3		13.6		34.1		9.4		37.2		39		36		17.5	
Potassium	mg/kg	NE	3,390	1,550	212	J	744	J	1,550		202	J	435	J	770	J	400	J	1,390		1,210		1,000		1,220	
Selenium	mg/kg	39	2	0.53	-	-	-	-	0.53	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	115	-	-	-	-	-	-	111	J	-	-	-	-	111	J	-	-	-	-	-	-	115	J
Thallium	mg/kg	0.078	1.3	1.5	-	-	-	-	0.29	J	-	-	-	-	-	-	-	-	0.41	J	-	-	**1.5**	J	-	-
Vanadium	mg/kg	39	40.9	30	15.4		25.2		21.8		8		18.1		18.7		16.6		23.2		28.9		30		14.7	
Zinc	mg/kg	2,300	321.75	163	21.3		43.9		57.6		9.4		157		163		21.1		57		62.9		74		50.5	
GENERAL CHEMISTRY																										
Total organic carbon	Percent	NE	NE	0.27	0.27		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - CY1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY1-SB04					
				SAMPLE NO	CY0012		CY0013		CY0014	
				DATE	12/20/2011		12/20/2011		12/20/2011	
				DEPTH	1 - 2 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	0.0313	J	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	0.0334	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.183	0.183	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0255	0.0255	J	-	-	-	-
Pyrene	mg/kg	170	NE	0.124	0.0309	J	-	-	-	-
METALS										
Aluminum	mg/kg	7,700	15,500	13,100	5,480		8,830	J	8,400	
Antimony	mg/kg	3.1	9.3	1.4	0.17	J	0.13	J	0.16	J
Arsenic	mg/kg	0.39	36.5	34.6	24.6		8.4	J	8.3	
Barium	mg/kg	1,500	826	100	46.5		55.1	J	42.5	
Beryllium	mg/kg	16	1	0.67	0.26	J	0.44	J	0.41	
Cadmium	mg/kg	7	NE	0.8	0.8		0.57	J	0.65	
Calcium	mg/kg	NE	52,300	50,000	1,080		19,800	J	26,500	
Chromium	mg/kg	NE	29	20.1	13		13	J	12.1	
Cobalt	mg/kg	2.3	116	18	3.3	J	9.7	J	6.5	
Copper	mg/kg	310	56.2	30	12		19.9	J	19	
Iron	mg/kg	5,500	234,000	43,000	31,700		19,100	J	15,200	
Lead	mg/kg	40	48.6	29.8	7.6		11.4		12.1	
Magnesium	mg/kg	NE	10,400	12,500	748		8,220	J	6,880	
Manganese	mg/kg	180	3,506	721	93.6		279	J	217	
Mercury	mg/kg	1	0.09	0.076	0.049	J	0.018	J	0.015	J
Nickel	mg/kg	150	55.1	39	9.8		24.7	J	19.9	
Potassium	mg/kg	NE	3,390	1,550	716		1,280	J	1,470	
Selenium	mg/kg	39	2	0.53	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	0.074	J	-	-	-	-
Sodium	mg/kg	NE	NE	115	89.5	J	92.3	J	96.7	J
Thallium	mg/kg	0.078	1.3	1.5	0.64	J	0.38	J	-	-
Vanadium	mg/kg	39	40.9	30	22.8		17.1	J	14.3	
Zinc	mg/kg	2,300	321.75	163	27.9		44.7	J	37.5	
GENERAL CHEMISTRY										
Total organic carbon	Percent	NE	NE	0.27	-	-	-	-	-	-

mg/kg - Milligrams per kilogram.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
BSC - Background screening concentration.
MDC - Maximum detected concentration for the area of concern.
Shaded cell indicates value is greater than RBSC.
Bolded text indicates values are greater than BSC.
NE - Not established (RBSCs), not evaluated (BSCs).
"-" - Not detected.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 4-2

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil - CY1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg										
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]		
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg		COPC? [c,d]
Inorganics													
Aluminum	4 / 4	100	2.03E+03		5.48E+03		8.20E-01	1.40E+00	4.30E+03	1.55E+04	7700		N (b)
Antimony	3 / 4	75	1.20E-01	J	1.70E-01	J	4.10E-02	6.80E-02	1.23E-01	9.30E+00	3.1		N (b)
Arsenic	4 / 4	100	3.10E+00		3.46E+01		4.10E-02	6.80E-02	1.78E+01	3.65E+01	0.39		N (b)
Barium	4 / 4	100	1.85E+01		4.65E+01		4.10E-02	6.80E-02	3.01E+01	8.26E+02	1500		N (b)
Beryllium	4 / 4	100	6.10E-02	J	3.20E-01		4.10E-03	6.80E-03	2.20E-01	1.00E+00	16		N (b)
Cadmium	2 / 4	50	1.70E-01	J	8.00E-01		4.10E-03	6.80E-03	2.45E-01	NA	7		N (b)
Calcium	4 / 4	100	4.47E+02		2.34E+03		2.00E+00	3.40E+00	1.15E+03	5.23E+04	Nutrient		N (c)
Chromium	4 / 4	100	3.90E+00		1.30E+01		4.10E-02	6.80E-02	8.35E+00	2.90E+01	0.29		N (b)
Cobalt	4 / 4	100	7.90E-01	J	3.30E+00	J	4.10E-02	6.80E-02	2.62E+00	1.16E+02	2.3		N (b)
Copper	4 / 4	100	3.30E+00		1.20E+01		4.10E-02	6.80E-02	7.20E+00	5.62E+01	310		N (b)
Iron	4 / 4	100	7.84E+03		3.17E+04		1.40E+00	2.30E+00	1.51E+04	2.34E+05	5500		N (b)
Lead	4 / 4	100	4.80E+00		7.60E+00		4.10E-02	6.80E-02	6.28E+00	4.86E+01	400		N (b)
Magnesium	4 / 4	100	2.74E+02		1.09E+03		2.00E+00	3.40E+00	6.82E+02	1.04E+04	Nutrient		N (c)
Manganese	4 / 4	100	2.37E+01		1.48E+02		4.10E-02	6.80E-02	7.40E+01	3.51E+03	180		N (b)
Mercury	4 / 4	100	1.30E-02	J	4.90E-02	J	6.60E-03	7.00E-03	2.95E-02	8.50E-02	2.3		N (b)
Nickel	4 / 4	100	2.30E+00		9.80E+00		4.10E-02	6.80E-02	7.33E+00	5.51E+01	150		N (b)
Potassium	4 / 4	100	2.02E+02	J	7.16E+02		2.00E+00	3.40E+00	3.83E+02	3.39E+03	Nutrient		N (c)
Silver	1 / 4	25	7.40E-02	J	7.40E-02	J	4.10E-02	6.80E-02	5.70E-02	1.11E+01	39		N (b)
Sodium	3 / 4	75	8.95E+01	J	1.11E+02	J	3.10E+01	5.10E+01	8.79E+01	NA	Nutrient		N (c)
Thallium	1 / 4	25	6.40E-01	J	6.40E-01	J	4.10E-02	6.80E-02	1.99E-01	1.30E+00	0.078		N (b)
Vanadium	4 / 4	100	8.00E+00		2.28E+01		4.10E-02	6.80E-02	1.57E+01	4.09E+01	39		N (b)
Zinc	4 / 4	100	9.40E+00		2.79E+01		4.10E-02	6.80E-02	1.99E+01	3.22E+02	2300		N (b)
Semivolatile Organic Compounds													
Fluoranthene	1 / 4	25	3.13E-02	J	3.13E-02	J	2.00E-02	2.30E-02	2.28E-02		230		N (a)
Methylnaphthalene, 2-	2 / 4	50	2.64E-02	J	3.34E-02	J	2.00E-02	2.30E-02	2.50E-02		23		N (a)
Naphthalene	1 / 4	25	1.83E-01	J	1.83E-01	J	3.20E-02	3.70E-02	6.98E-02		3.6		N (a)
Phenanthrene	1 / 4	25	2.55E-02	J	2.55E-02	J	2.00E-02	2.30E-02	2.14E-02		170	e	N (a)
Pyrene	1 / 4	25	3.09E-02	J	3.09E-02	J	2.00E-02	2.30E-02	2.27E-02		170		N (a)

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] Value is either the 95th percent upper tolerance limit or the maximum detected value of the background data set, whichever is less. Source: IT Corporation (IT), 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment* , Final, Former Plum Brook Ordnance Works, November, and reports

[b] Risk-Based Screening Concentrations based on USEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration is less than the RBSC.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.

[d] Y = Chemical is chosen as COPC.

[e] RBSC based on acenapthene.

Source: Coal Yard No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 4-3

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil - CY1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Reporting Limits		Mean	BSC [a]	RBSC [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	6.02E+03		1.23E+04		9.50E-01	5.30E+00	9.18E+03	1.55E+04	7700	N (b)
Antimony	3 / 8	38	1.30E-01	J	2.30E-01	J	5.00E-02	2.70E-01	1.61E-01	9.30E+00	3.1	N (b)
Arsenic	8 / 8	100	3.80E+00		1.13E+01		4.70E-02	2.70E-01	7.63E+00	3.65E+01	0.39	N (b)
Barium	8 / 8	100	4.25E+01		8.22E+01		4.70E-02	2.70E-01	6.17E+01	8.26E+02	1500	N (b)
Beryllium	8 / 8	100	3.60E-01		6.50E-01		4.70E-03	2.70E-02	5.10E-01	1.00E+00	16	N (b)
Cadmium	7 / 8	88	1.50E-01	J	6.50E-01		5.00E-03	2.70E-02	3.82E-01	NA	7	N (a)
Calcium	8 / 8	100	3.01E+03		5.00E+04		2.50E+00	1.30E+01	1.57E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	1.07E+01		1.90E+01		5.00E-02	2.70E-01	1.46E+01	2.90E+01	0.29	N (b)
Cobalt	8 / 8	100	6.40E+00		1.80E+01		4.70E-02	2.70E-01	1.09E+01	1.16E+02	2.3	N (b)
Copper	8 / 8	100	1.76E+01		2.58E+01		4.70E-02	2.70E-01	2.04E+01	5.62E+01	310	N (b)
Iron	8 / 8	100	1.32E+04		2.34E+04		1.60E+00	9.00E+00	1.83E+04	2.34E+05	5500	N (b)
Lead	8 / 8	100	1.03E+01		2.98E+01		4.90E-02	1.90E-01	1.38E+01	4.86E+01	400	N (b)
Magnesium	8 / 8	100	1.18E+03		1.25E+04		2.40E+00	1.30E+01	5.59E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.88E+02		7.21E+02		4.70E-02	2.70E-01	3.40E+02	3.51E+03	180	N (b)
Mercury	8 / 8	100	1.50E-02	J	7.60E-02	J	6.90E-03	7.40E-03	2.83E-02	8.50E-02	2.3	N (b)
Nickel	8 / 8	100	1.36E+01		3.81E+01		4.70E-02	2.70E-01	2.59E+01	5.51E+01	150	N (b)
Potassium	8 / 8	100	4.35E+02	J	1.55E+03		2.40E+00	1.30E+01	1.10E+03	3.39E+03	Nutrient	N (c)
Selenium	1 / 8	13	5.30E-01	J	5.30E-01	J	1.00E-01	5.30E-01	2.74E-01	2.00E+00	39	N (b)
Sodium	3 / 8	38	9.23E+01	J	1.15E+02	J	3.60E+01	2.00E+02	9.76E+01	NA	Nutrient	N (c)
Thallium	3 / 8	38	2.34E-01	J	3.80E-01	J	4.90E-02	1.90E-01	1.64E-01	1.30E+00	0.078	N (b)
Vanadium	8 / 8	100	1.43E+01		2.61E+01		4.70E-02	2.70E-01	1.95E+01	4.09E+01	39	N (b)
Zinc	8 / 8	100	3.75E+01		1.63E+02		5.00E-02	2.70E-01	7.68E+01	3.22E+02	2300	N (b)
Semivolatile Organic Compounds												
Dibenzofuran	1 / 8	13	1.03E-01	J	1.03E-01	J	2.00E-02	8.40E-02	3.13E-02		7.8	N (a)
Fluoranthene	1 / 8	13	1.38E-01	J	1.38E-01	J	2.00E-02	8.40E-02	3.56E-02		230	N (a)
Fluorene	1 / 8	13	1.05E-01	J	1.05E-01	J	2.00E-02	8.40E-02	3.15E-02		230	N (a)
Pyrene	1 / 8	13	1.24E-01	J	1.24E-01	J	2.00E-02	8.40E-02	3.39E-02		170	N (a)

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] Value is either the 95th percent upper tolerance limit or the maximum detected value of the background data set, whichever is less. Source: IT Corporation (IT), 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment*, Final, Former Plum Brook Ordnance Works, November, and reports referenced therein.
[b] Risk-Based Screening Concentrations based on USEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration is less than the RBSC.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.

Source: Coal Yard No. 1 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 4-4

Statistical Summary and Selection of Chemicals of Potential Ecological Concern in Soil (0 to 6 feet bgs) - CY1
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	ESV [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	(mg/kg)	COPEC? [c,d]
Inorganics												
Aluminum	8 / 8	100	2.03E+03		1.23E+04		8.20E-01	2.10E+00	6.80E+03	1.55E+04	pH Dependent	N (b)
Antimony	5 / 8	63	1.20E-01	J	2.30E-01	J	4.10E-02	1.09E-01	1.32E-01	9.30E+00	0.27	N (b)
Arsenic	8 / 8	100	3.10E+00		3.46E+01		4.10E-02	1.09E-01	1.28E+01	3.65E+01	18	N (b)
Barium	8 / 8	100	1.85E+01		8.22E+01		4.10E-02	1.09E-01	4.70E+01	8.26E+02	330	N (b)
Beryllium	8 / 8	100	6.10E-02	J	6.50E-01		4.10E-03	1.09E-02	3.74E-01	1.00E+00	21	N (b)
Cadmium	6 / 8	75	1.50E-01	J	8.00E-01		4.10E-03	1.09E-02	3.22E-01	NA	0.36	Y
Calcium	8 / 8	100	4.47E+02		1.98E+04	J	2.00E+00	5.30E+00	4.63E+03	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	3.90E+00		1.90E+01		4.10E-02	1.09E-01	1.14E+01	2.90E+01	26	N (b)
Cobalt	8 / 8	100	7.90E-01	J	1.49E+01		4.10E-02	1.09E-01	6.61E+00	1.16E+02	13	N (b)
Copper	8 / 8	100	3.30E+00		2.58E+01		4.10E-02	1.09E-01	1.40E+01	5.62E+01	28	N (b)
Iron	8 / 8	100	7.84E+03		3.17E+04		1.40E+00	3.65E+00	1.74E+04	2.34E+05	pH Dependent	N (b)
Lead	8 / 8	100	4.80E+00		2.98E+01		4.10E-02	6.80E-02	1.11E+01	4.86E+01	11	N (b)
Magnesium	8 / 8	100	2.74E+02		8.22E+03	J	2.00E+00	5.30E+00	2.46E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	2.37E+01		3.46E+02	J	4.10E-02	1.09E-01	1.78E+02	3.51E+03	220	N (b)
Mercury	8 / 8	100	1.30E-02	J	4.90E-02	J	6.60E-03	7.40E-03	2.74E-02	8.50E-02	0.00051	N (b)
Nickel	8 / 8	100	2.30E+00		3.81E+01		4.10E-02	1.09E-01	1.61E+01	5.51E+01	38	N (b)
Potassium	8 / 8	100	2.02E+02	J	1.30E+03		2.00E+00	5.30E+00	6.61E+02	3.39E+03	Nutrient	N (c)
Silver	1 / 8	13	7.40E-02	J	7.40E-02	J	4.10E-02	1.09E-01	6.94E-02	1.11E+01	4.2	N (b)
Sodium	4 / 8	50	8.95E+01	J	1.11E+02	J	3.10E+01	8.00E+01	8.10E+01	NA	Nutrient	N (c)
Thallium	3 / 8	38	2.34E-01	J	6.40E-01	J	4.10E-02	6.80E-02	1.90E-01	1.30E+00	1	N (b)
Vanadium	8 / 8	100	8.00E+00		2.61E+01		4.10E-02	1.09E-01	1.87E+01	4.09E+01	7.8	N (b)
Zinc	8 / 8	100	9.40E+00		1.57E+02		4.10E-02	1.09E-01	4.82E+01	3.22E+02	46	N (b)
Semivolatile Organic Compounds												
Dibenzofuran	1 / 8	13	1.03E-01	J	1.03E-01	J	2.00E-02	8.40E-02	3.13E-02		NSV	Y
Fluoranthene	2 / 8	25	3.13E-02	J	1.38E-01	J	2.00E-02	8.40E-02	3.67E-02		1.1	N (a)
Fluorene	1 / 8	13	1.05E-01	J	1.05E-01	J	2.00E-02	8.40E-02	3.15E-02		1.1	N (a)
Methylnaphthalene, 2-	2 / 8	25	2.64E-02	J	3.34E-02	J	2.00E-02	8.40E-02	3.10E-02		3.24	N (a)
Naphthalene	1 / 8	13	1.83E-01	J	1.83E-01	J	3.20E-02	1.30E-01	6.40E-02		29	N (a)
Phenanthrene	1 / 8	13	2.55E-02	J	2.55E-02	J	2.00E-02	8.40E-02	2.92E-02		29	N (a)
Pyrene	2 / 8	25	3.09E-02	J	1.24E-01	J	2.00E-02	8.40E-02	3.49E-02		1.1	N (a)

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] ESVs and their sources are in Appendix B of the SLERA.
[c] N = Chemical is not chosen as a COPEC:
(a) = maximum detected concentration is less than the ESV.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPEC.

Source: Coal Yard No. 1 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

Table 5-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 3-SB01				ASH PIT 3-SB02				ASH PIT 3-SB03	
				SAMPLE NO	AP0032		AP0033		AP0036		AP0037		AP0039	
				SAMPLE DATE	19-Aug-09		19-Aug-09		19-Aug-09		19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		3 - 5 Ft		0 - 1 Ft		1.2 - 2.3 Ft		0.2 - 1.7 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES														
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0563	J	-	-	-	-	0.0512	J	-	-
SEMIVOLATILES														
Acenaphthylene	mg/kg	NE	NE	0.0516	0.0516	J	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	0.156	0.156	J	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.168	0.168	J	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.268	0.268		-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	0.0882	J	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	0.0972	J	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.19	0.19	J	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.401	0.401		-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.0914	0.0914	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.107	0.107	J	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.273	0.273		-	-	-	-	-	-	-	-
PCBs														
Aroclor 1260	mg/kg	0.22	NE	0.043	0.015	J	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	11400	5,060	J	7,010	J	7,580	J	10,400	J	8,820	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	7.7		5		4.9		12.9		12.4	
Barium	mg/kg	1,500	826	203	59		41.2		48.1		85.7		90.7	
Beryllium	mg/kg	16	1	2.1	0.69		0.5		0.57		**1.5**		**1.7**	
Cadmium	mg/kg	7	NE	0.44	0.33		0.18	J	-	-	-	-	-	-
Calcium	mg/kg	NE	52,300	54300	8,460	J	49,300	J	11,700	J	9,690	J	11,200	J
Chromium	mg/kg	0.29	29	18.8	8.8	J	10.3	J	11	J	14.9	J	14.3	J
Cobalt	mg/kg	2.3	116	12.2	4.5	J	6.7	J	5.7	J	6.3	J	6.7	J
Copper	mg/kg	310	56.2	124	**124**		18.4		11.6		16.2		14.2	
Iron	mg/kg	5,500	234,000	68300	12,400	J	14,500	J	13,300	J	24,700	J	20,100	J
Lead	mg/kg	400	48.6	20.4	16.5		9.3	J	9.7		3.4	J	3.9	J
Magnesium	mg/kg	NE	10,400	19400	2,640	J	**16,600**	J	5,000	J	891	J	1,210	J
Manganese	mg/kg	180	3,506	1270	99.2	J	410	J	353	J	120	J	148	J
Mercury	mg/kg	2.3	0.09	0.15	**0.15**		0.015	J	0.047	J	-	-	0.036	J
Nickel	mg/kg	150	55.1	31.9	13		17.1		13.6		13.4		15.1	
Potassium	mg/kg	NE	3,390	2110	524	J	1,970	J	818	J	1,570	J	1,290	J
Selenium	mg/kg	39	2	3.3	1.1	J	0.84	J	0.59	J	**2.2**	J	1.9	J
Sodium	mg/kg	NE	NE	658	238	J	293	J	196	J	640	J	570	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	33.5	14.1		16.3		19.3		24.3		23.2	
Zinc	mg/kg	2,300	321.75	78.7	70.5	J	44.7	J	40.4	J	30.5	J	15.9	J

Table 5-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 3-SB04				ASH PIT 3-SB05				ASH PIT 3-SB06					
				SAMPLE NO	AP0042		AP0043		AP0045		AP0046		AP0048		AP0049		AP0061A	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		20-Aug-09		20-Aug-09		20-Aug-09	
				DEPTH	0.3 - 0.8 Ft		0.8 - 1.5 Ft		0.3 - 1.0 Ft		1 - 2 Ft		0.2 - 1 Ft		1 - 2 Ft		2 - 2_7 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																		
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	0.0562	J	-	-	-	-	-	-	-	-
SEMIVOLATILES																		
Acenaphthylene	mg/kg	NE	NE	0.0516	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	0.156	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.168	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.268	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.401	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.0914	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.107	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.273	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																		
Aroclor 1260	mg/kg	0.22	NE	0.043	0.043	J	-	-	-	-	-	-	-	-	-	-	-	-
METALS																		
Aluminum	mg/kg	7,700	15,500	11400	8,240		4,870		9,350		6,010		8,770		11,400		7,840	
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	0.67	J	1.2	J	1.3	J	0.93	J
Arsenic	mg/kg	0.39	36.5	60.8	29		8.5		13.7		20.3		12.7		16.7		30.6	
Barium	mg/kg	1,500	826	203	127		41.5		82.2		63.7		203		113		65.1	
Beryllium	mg/kg	16	1	2.1	**2.1**		0.4		**1.5**		0.47		0.74		0.92		0.56	
Cadmium	mg/kg	7	NE	0.44	0.3	J	0.2	J	-	-	0.21	J	-	-	-	-	0.17	J
Calcium	mg/kg	NE	52,300	54300	15,900		47,500		12,800		**52,800**		2,060		3,200		46,100	
Chromium	mg/kg	0.29	29	18.8	15.5		7.7		13.6		9.6		9.6		12		11.8	
Cobalt	mg/kg	2.3	116	12.2	8.9		5.9		7.4		5.8		4.5		6.3		8.5	
Copper	mg/kg	310	56.2	124	43.6		15		19.3		17.5		21.6		26.5		17.6	
Iron	mg/kg	5,500	234,000	68300	24,000		11,200		22,800		16,700		68,300		67,800		20,500	
Lead	mg/kg	400	48.6	20.4	20.4		8.1	J	12.5	J	9.6	J	4.5	J	7	J	10	J
Magnesium	mg/kg	NE	10,400	19400	2,300		**14,900**		1,120		**17,500**		343	J	610		**15,700**	
Manganese	mg/kg	180	3,506	1270	322		362		339		432		54.5		81.7		402	
Mercury	mg/kg	2.3	0.09	0.15	**0.13**	J	0.014	J	-	-	0.03	J	-	-	0.037	J	0.016	J
Nickel	mg/kg	150	55.1	31.9	22.9		14.3		17.2		16.4		11.5		16		18.8	
Potassium	mg/kg	NE	3,390	2110	1,060	J	1,290		1,110	J	1,490		923		1,380		1,900	
Selenium	mg/kg	39	2	3.3	**2.9**	J	1.1	J	1.7	J	1.1	J	1.4	J	1.5	J	**2.1**	J
Sodium	mg/kg	NE	NE	658	510	J	224	J	531	J	261	J	493	J	634	J	300	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	-	-	**3**		**2.9**		-	-
Vanadium	mg/kg	39	40.9	33.5	28.4		13.3		23.7		15.5		15.1		19.5		17.7	
Zinc	mg/kg	2,300	321.75	78.7	68.3		37		66.3		41.6		17.2		31.3		49.3	

Table 5-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 3-SB07								ASH PIT 3-SB08							
				SAMPLE NO	AP0051		AP0052		AP0059		AP0060		AP0054		AP0056		AP0057A		AP0055	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0 - 1 Ft		1 - 2 Ft		1 - 2 Ft		1 - 2 Ft		0.3 - 1 Ft		0.3 - 1 Ft		0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG		FD		FS		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	0.0547	J	0.0776	J	-	-	-	-
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.0516	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	0.156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.268	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.401	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.0914	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	11400	4,760		9,910		9,620		8,630		7,540		10,400		9,390		8,970	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.72	J	-	-	-	-	-	-	0.88	J	-	-	0.5	J
Arsenic	mg/kg	0.39	36.5	60.8	7.7		9.3		6.9		7		27.3		**60.8**		35.2		32.7	
Barium	mg/kg	1,500	826	203	38.5		70.5		70.1		77.2		83.5		110		93.6		98.4	
Beryllium	mg/kg	16	1	2.1	0.41	J	0.67		0.63		-	-	**1.6**		**2**		-	-	0.64	
Cadmium	mg/kg	7	NE	0.44	0.44		0.21	J	0.19	J	-	-	-	-	-	-	-	-	0.14	J
Calcium	mg/kg	NE	52,300	54300	14,100		42,400		47,800		**54,300**		17,700		14,900		14,800		28,000	
Chromium	mg/kg	0.29	29	18.8	6.9		15		14.5		14.8		14.3		18.8		17.5		12.6	
Cobalt	mg/kg	2.3	116	12.2	5		8.1		7.3		8.4		7.6		8.1		-	-	12.2	
Copper	mg/kg	310	56.2	124	38.9		21.7		19.4		15.4		20.5		27.6		29.1		20.9	
Iron	mg/kg	5,500	234,000	68300	15,200		17,700		14,900		17,500		28,400		50,200		38,300		28,300	
Lead	mg/kg	400	48.6	20.4	12.2		11.9	J	11.2	J	9.5		6.7	J	9.8	J	12.2		8.6	
Magnesium	mg/kg	NE	10,400	19400	3,130		**15,800**		**17,500**		**19,400**		1,590		2,110		1,720		**12,400**	
Manganese	mg/kg	180	3,506	1270	217		477		460		498		280		253		282		1,270	
Mercury	mg/kg	2.3	0.09	0.15	0.066	J	0.026	J	0.022	J	-	-	0.079	J	0.071	J	-	-	0.029	J
Nickel	mg/kg	150	55.1	31.9	13.1		22.7		21.4		20.5		17.9		20.7		28.5		31.9	
Potassium	mg/kg	NE	3,390	2110	634	J	2,110		2,110		1,770		948	J	1,280	J	-	-	1,400	
Selenium	mg/kg	39	2	3.3	1.6	J	0.9	J	0.98	J	-	-	**2.2**	J	**3.3**	J	**2.5**		0.66	J
Sodium	mg/kg	NE	NE	658	168	J	269	J	280	J	-	-	470	J	658	J	-	-	324	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	**2.7**		-	-	-	-	-	-	0.5	J
Vanadium	mg/kg	39	40.9	33.5	10.7		21.9		21.1		19.7		24.3		33.5		27.4		20.3	
Zinc	mg/kg	2,300	321.75	78.7	78.7		53.2		49.5		59.3		27.2		40.8		43.3		50.6	

Table 5-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
mg/kg - Milligram per kilogram.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
Q - Result calculated from linear regression. The instrument response is less than 20% of the instrument response of the low standard of the calibration curve. Per the analytical method, an instrument response below 20% of the low standard for any particular compound should be reported by the lab as non-detect.

Table 5-2

Detections Above RBSCs in Sediment Samples - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP3-SD01		AP3-SD02		AP3-SD03	
			SAMPLE NO	AP1009		AP1010		AP1011	
			SAMPLE DATE	23-May-09		23-May-09		23-May-09	
			DEPTH	0 - 0.5 Ft		0 - 0.5 Ft		0 - 0.5 Ft	
			SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES									
Benzo(a)anthracene	mg/kg	0.15	0.143	0.143	J				
Benzo(a)pyrene	mg/kg	0.015	0.158	0.158	J				
Benzo(b)fluoranthene	mg/kg	0.15	0.24	0.24	J				
Benzo(ghi)perylene	mg/kg	NE	0.101	0.101	J				
Benzo(k)fluoranthene	mg/kg	1.5	0.0805	0.0805	J				
Chrysene	mg/kg	15	0.159	0.159	J				
Fluoranthene	mg/kg	2,300	0.253	0.253	J				
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	0.111	0.111	J				
Pyrene	mg/kg	1,700	0.206	0.206	J				
METALS									
Aluminum	mg/kg	77,000	3610	3,610					
Antimony	mg/kg	31	0.54	0.54	J				
Arsenic	mg/kg	0.39	6.4	6.4					
Barium	mg/kg	15,000	26.6	26.6					
Beryllium	mg/kg	160	0.26	0.26	J				
Cadmium	mg/kg	70	0.3	0.3	J				
Calcium	mg/kg	NE	9610	9,610	J				
Chromium	mg/kg	0.29	6.4	6.4					
Cobalt	mg/kg	23	4.1	4.1	J				
Copper	mg/kg	3,100	126	126					
Iron	mg/kg	55,000	13000	13,000	J				
Lead	mg/kg	400	8.7	8.7	J				
Magnesium	mg/kg	NE	4370	4,370	J				
Manganese	mg/kg	1,800	130	130	J				
Mercury	mg/kg	23	0.027	0.027	J				
Nickel	mg/kg	1,500	10.5	10.5	J				
Potassium	mg/kg	NE	337	337	J				
Selenium	mg/kg	390	0.54	0.54	B				
Vanadium	mg/kg	390	11.3	11.3					
Zinc	mg/kg	23,000	52.8	52.8	J				
GENERAL CHEMISTRY									
Total organic carbon	mg/kg	NE	28000	28,000					

Sediment samples AP1010 and AP1011 were analyzed only for explosives and PCBs. Since neither contaminants were present, no data is shown.

NE - Not established (RBSCs).
Shaded cell indicates value is greater than RBSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).
"-" - Not Detected.
mg/kg - milligrams per kilogram.
RI - Remedial investigation.

Table 5-3

Detections Above RBSCs and or BSCs in Overburden/Shale Groundwater - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE		AP3-MW01								AP3-MW02				AP3-MW03			
			SAMPLE NUMBER		AP3083		AP3084		AP3085		AP3088		AP3086		AP3091		AP3087		AP3092	
			SAMPLE DATE		19-Dec-11		19-Dec-11		19-Dec-11		30-May-12		16-Dec-11		30-May-12		20-Dec-11		30-May-12	
			DEPTH		1.3 - 1.3 Ft		1.3 - 1.3 Ft		1.3 - 1.3 Ft		0 - 0 Ft		10.02 - 10.19 Ft		0 - 0 Ft		7.22 - 7.41 Ft		0 - 0 Ft	
			PURPOSE		REG		FD		FS		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Nitrotoluene, 2-	µg/L	0.27	NE	0.18	-	-	-	-	-	-	0.18	J	-	-	-	-	-	-	-	-
VOLATILES																				
Acetone	µg/L	1,200	NE	17.6	-	-	-	-	-	-	-	-	-	-	-	-	17.6	J	-	-
Chloromethane	µg/L	19	NE	1.6	-	-	-	-	-	-	-	-	-	-	-	-	1.6	J	-	-
Dichloroethane, 1,1-	µg/L	2.4	NE	1.7	1.7		1.6		1.3		-	-	-	-	-	-	-	-	-	-
Trichloroethane, 1,1,1-	µg/L	750	NE	0.27	0.27	J	0.26	J	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Bis(2-ethylhexyl)phthalate	µg/L	0.071	NE	0.8	-	-	-	-	**0.8**	B			-	-			-	-		
METALS (UNFILTERED)																				
Aluminum	µg/L	1,600	309	88.9	-	-	-	-	-	-	71	J	-	-	40.2	J	88.9	J	34.9	J
Arsenic	µg/L	0.045	7.4	9.9	-	-	-	-	-	-	**9.9**	J	-	-	**5.2**	J	-	-	-	-
Barium	µg/L	290	11,800	220	40.6	J	39.5	J	45	J	110	J	220	J	113	J	67	J	47.5	J
Calcium	µg/L	NE	316,000	161,000	117,000	J	121,000	J	130,000		116,000		140,000	J	118,000		161,000	J	157,000	
Chromium	µg/L	NE	NE	1.3	-	-	-	-	-	-	-	-	1.3	J	-	-	-	-	-	-
Cobalt	µg/L	0.47	12.1	2.1	**1.2**	J	**1.1**	J	**1.7**	J	-	-	-	-	**2.1**	J	-	-	**1.6**	J
Iron	µg/L	1,100	1,550	2,240	57.5	J	70.6	J	130	J	**2,240**		-	-	661		-	-	631	
Magnesium	µg/L	NE	217,000	71,600	25,900	J	27,700	J	29,000		45,900		71,600	J	66,300		51,200	J	55,200	
Manganese	µg/L	32	636	1,900	**1,760**		**1,780**		**1,900**		**779**		**52**		**270**		**151**		**472**	
Nickel	µg/L	30	8.6	2.4	-	-	-	-	-	-	-	-	-	-	-	-	2.4	J	-	-
Potassium	µg/L	NE	116,000	11,100	805	J	716	J	900	J	4,050	J	3,840	J	5,030	J	11,100		4,680	J
Sodium	µg/L	NE	1,390,000	154,000	20,100		19,500		20,000		20,100		23,300		40,100		154,000		105,000	
Vanadium	µg/L	7.8	NE	2.1	-	-	-	-	-	-	-	-	2.1	J	-	-	2.1	J	-	-
Zinc	µg/L	470	507	18.4	-	-	-	-	-	-	15.1	J	7.6	J	13	J	7.7	J	18.4	J
METALS (FILTERED)																				
Aluminum	µg/L	1,600	309	46.7	-	-	-	-	-	-							46.7	J		
Arsenic	µg/L	0.045	7.4	4.1	-	-	-	-	**4.1**	J							-	-		
Barium	µg/L	290	11,800	75.3	40.5	J	43.5	J	46	J							75.3	J		
Calcium	µg/L	NE	316,000	169,000	119,000		125,000		130,000								169,000			
Cobalt	µg/L	0.47	12.1	1.4	**1.4**	J	**1.3**	J	-	-							-	-		
Copper	µg/L	62	19.8	7.3	7.3	J	-	-	-	-							-	-		
Iron	µg/L	1,100	1,550	81	74.1	J	67.4	J	81	J							-	-		
Magnesium	µg/L	NE	217,000	54,100	27,400		29,000		29,000								54,100			
Manganese	µg/L	32	636	1,900	**1,720**		**1,800**		**1,900**								**151**			
Potassium	µg/L	NE	116,000	11,300	744	J	766	J	860	J							11,300			
Selenium	µg/L	7.8	NE	2.9	-	-	-	-	-	-							2.9	J		
Sodium	µg/L	NE	1,390,000	153,000	19,800		21,300		19,000								153,000			
Vanadium	µg/L	7.8	NE	2.4	-	-	-	-	-	-							2.4	J		
WATER QUALITY PARAMETERS																				
Alkalinity	µg/L	NE	NE	300,000					300,000											
Alkalinity, Carbonate	µg/L	NE	NE	398,000	302,000	J	305,000	J					392,000				398,000	J		
Chloride	µg/L	NE	NE	27,000	1,800	J	1,700	J	1,700				11,000				27,000			
Hardness (as CaCO3)	µg/L	NE	NE	644,000	399,000		416,000		470,000		479,000		644,000		568,000		613,000		619,000	
Nitrate-Nitrite	µg/L	NE	NE	530	-	-	52	J	65	B			530				420			
Sulfate	µg/L	NE	NE	538,000	162,000	J	167,000	J	180,000				305,000				538,000			
Total dissolved solids	µg/L	NE	NE	1,210,000	557,000	J	398,000	J	530,000				788,000				1,210,000			
Total suspended solids	µg/L	NE	NE	8,000	-	-	-	-	-	-			-	-			8,000	J		
Turbidity	NTU	NE	NE	1.2	-	-	-	-	1				1.2				-	-		

Table 5-3

Detections Above RBSCs and or BSCs in Overburden/Shale Groundwater - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

BSC - Background screening concentration.

MDC - Maximum detected concentration for the area of concern ("B"-qualified data not included).

ug/L - Micrograms per liter.

NE - Not established (RBSCs), not evaluated (BSCs).

Shaded cell indicates value is greater than RBSC.

RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.

RI - Remedial investigation.

Bold text indicates value is greater than BSC.

Blank cell means that parameter was not analyzed.

"-" - Not detected.

Validation Qualifiers (VQ)

J - The analyte was positively identified, the reported value is estimated.

B - The compound/analyte was detected in a lab or field blank.

Table 5-4

Statistical Summary and Selection of COPCs in Surface Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Detected Concentrations Maximum	VQ	Reporting Limits Minimum	Reporting Limits Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	8 / 8	100	4.76E+03		9.35E+03		1.30E+01	2.90E+01	7.69E+03	1.55E+04	7700		N (b)		---
Antimony	2 / 8	25	1.20E+00	J	2.34E+00	/UJ	3.80E+00	9.30E+00	2.81E+00	9.30E+00	3.1		N (a)		---
Arsenic	8 / 8	100	4.90E+00		4.41E+01		5.00E-01	1.20E+00	1.65E+01	3.65E+01	0.39		Y	2.88E+01	2.88E+01
Barium	8 / 8	100	3.85E+01		2.03E+02		1.30E+01	2.90E+01	9.32E+01	8.26E+02	1500		N (a)		---
Beryllium	8 / 8	100	4.10E-01	J	2.10E+00		3.10E-01	7.40E-01	1.19E+00	1.00E+00	16		N (a)		---
Cadmium	3 / 8	38	3.00E-01	J	4.40E-01		2.50E-01	3.10E+00	5.26E-01	NA	7		N (a)		---
Calcium	8 / 8	100	2.06E+03		1.63E+04		3.10E+02	7.40E+02	1.16E+04	5.23E+04	Nutrient		N (c)		---
Chromium	8 / 8	100	6.90E+00		1.66E+01		1.30E+00	3.00E+00	1.20E+01	2.90E+01	0.29		N (b)		---
Cobalt	8 / 8	100	4.50E+00		8.90E+00		3.10E+00	7.40E+00	6.32E+00	1.16E+02	2.3		N (b)		---
Copper	8 / 8	100	1.16E+01		1.24E+02		1.60E+00	3.70E+00	3.72E+01	5.62E+01	310		N (a)		---
Iron	8 / 8	100	1.24E+04	J	6.83E+04		6.30E+00	1.60E+01	2.69E+04	2.34E+05	5500		N (b)		---
Lead	8 / 8	100	3.90E+00	J	2.04E+01		6.30E+00	1.60E+01	1.10E+01	4.86E+01	400		N (a)		---
Magnesium	8 / 8	100	3.43E+02	J	5.00E+03	J	3.10E+02	7.40E+02	2.20E+03	1.04E+04	Nutrient		N (c)		---
Manganese	8 / 8	100	5.45E+01		3.53E+02	J	1.10E+00	2.30E+00	2.25E+02	3.51E+03	180		N (b)		---
Mercury	6 / 8	75	3.60E-02	J	1.50E-01		1.10E-01	2.40E-01	8.49E-02	8.50E-02	2.3		N (a)		---
Nickel	8 / 8	100	1.15E+01		2.29E+01		2.50E+00	5.90E+00	1.57E+01	5.51E+01	150		N (a)		---
Potassium	8 / 8	100	5.24E+02	J	1.29E+03	J	6.30E+02	1.50E+03	9.34E+02	3.39E+03	Nutrient		N (c)		---
Selenium	8 / 8	100	5.90E-01	J	2.90E+00	J	6.30E+00	1.60E+01	1.74E+00	2.00E+00	39		N (a)		---
Sodium	8 / 8	100	1.68E+02	J	5.70E+02	J	6.30E+02	1.50E+03	4.09E+02	NA	Nutrient		N (c)		---
Thallium	1 / 8	13	3.00E+00	U	3.00E+00	U	6.30E-01	6.50E+00	1.85E+00	1.30E+00	0.078		Y	2.69E+00	2.69E+00
Vanadium	9 / 9	100	1.07E+01		2.89E+01		3.00E+00	7.80E+00	2.04E+01	4.09E+01	39		N (a)		---
Zinc	9 / 9	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.91E+01	3.22E+02	2300		N (a)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	2 / 8	25	1.50E-02	J	4.30E-02	J	2.20E-02	5.00E-02	2.08E-02		0.22		N (a)		---
Explosives															
Dinitrotoluene, 2,6-	3 / 8	38	5.62E-02	J	6.62E-02	JJ	1.60E-01	1.90E-01	7.67E-02		0.71		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 8	13	5.16E-02	J	5.16E-02	J	2.10E-01	4.95E-01	1.71E-01		340	g	N (a)		---
Benzo(a)anthracene	1 / 8	13	1.56E-01	J	1.56E-01	J	2.10E-01	4.95E-01	1.84E-01		0.15		Y	2.20E-01	1.56E-01
Benzo(a)pyrene	1 / 8	13	1.68E-01	J	1.68E-01	J	2.10E-01	4.95E-01	1.85E-01		0.015		Y	2.21E-01	1.68E-01
Benzo(b)fluoranthene	1 / 8	13	2.68E-01		2.68E-01		2.10E-01	4.95E-01	1.98E-01		0.15		Y	2.38E-01	2.38E-01
Benzo(ghi)perylene	1 / 8	13	8.82E-02	J	8.82E-02	J	2.10E-01	4.95E-01	1.75E-01		170	h	N (a)		---
Benzo(k)fluoranthene	1 / 8	13	9.72E-02	J	9.72E-02	J	2.10E-01	4.95E-01	1.76E-01		1.5		N (a)		---
Chrysene	1 / 8	13	1.90E-01	J	1.90E-01	J	2.10E-01	4.95E-01	1.88E-01		15		N (a)		---
Fluoranthene	1 / 8	13	4.01E-01		4.01E-01		2.10E-01	4.95E-01	2.14E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 8	13	9.14E-02	J	9.14E-02	J	2.10E-01	4.95E-01	1.75E-01		0.15		N (a)		---
Phenanthrene	1 / 8	13	1.07E-01	J	1.07E-01	J	2.10E-01	4.95E-01	1.77E-01		170	h	N (a)		---
Pyrene	1 / 8	13	2.73E-01		2.73E-01		2.10E-01	4.95E-01	1.98E-01		170		N (a)		---

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.

Table 5-4

Statistical Summary and Selection of COPCs in Surface Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL software (U.S. Environmental Protection Agency (EPA), 2011, ProUCL Version 4.1.01, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on acenaphthene.
[n] RBSC based on pyrene.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-5

Statistical Summary and Selection of COPCs in Subsurface Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	4.87E+03		1.14E+04		1.20E+01	2.70E+01	8.28E+03	1.55E+04	7.70E+03	N (b)
Antimony	5 / 8	63	5.00E-01	J	2.26E+00	JU	3.50E+00	1.20E+01	2.11E+00	9.30E+00	3.10E+00	N (a)
Arsenic	8 / 8	100	5.00E+00		3.27E+01		4.70E-01	1.60E+00	1.69E+01	3.65E+01	3.90E-01	N (b)
Barium	8 / 8	100	4.12E+01		1.13E+02		1.20E+01	2.70E+01	7.24E+01	8.26E+02	1.50E+03	N (a)
Beryllium	8 / 8	100	4.00E-01		1.50E+00		2.90E-01	6.70E-01	7.05E-01	1.00E+00	1.60E+01	N (a)
Cadmium	6 / 8	75	1.40E-01	J	2.10E-01	J	2.30E-01	4.00E+00	4.21E-01	NA	7.00E+00	N (a)
Calcium	8 / 8	100	3.20E+03		5.28E+04		3.00E+02	6.70E+02	3.52E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	7.70E+00		1.49E+01	J	1.20E+00	2.60E+00	1.17E+01	2.90E+01	2.90E-01	N (b)
Cobalt	8 / 8	100	5.80E+00		1.22E+01		2.90E+00	6.70E+00	7.43E+00	1.16E+02	2.30E+00	N (b)
Copper	8 / 8	100	1.50E+01		2.65E+01		1.50E+00	3.40E+00	1.91E+01	5.62E+01	3.10E+02	N (a)
Iron	8 / 8	100	1.12E+04		6.78E+04		5.80E+00	2.00E+01	2.50E+04	2.34E+05	5.50E+03	N (b)
Lead	8 / 8	100	3.40E+00	J	1.16E+01	JJ	5.90E+00	2.00E+01	8.44E+00	4.86E+01	4.00E+02	N (a)
Magnesium	8 / 8	100	6.10E+02		1.75E+04		2.90E+02	6.70E+02	1.19E+04	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	8.17E+01		1.27E+03		1.80E+00	8.90E+00	4.43E+02	3.51E+03	1.80E+02	N (b)
Mercury	7 / 8	88	1.40E-02	J	3.70E-02	J	9.00E-02	2.20E-01	3.44E-02	8.50E-02	2.30E+00	N (a)
Nickel	8 / 8	100	1.34E+01		3.19E+01		2.30E+00	5.40E+00	1.87E+01	5.51E+01	1.50E+02	N (a)
Potassium	8 / 8	100	1.29E+03		2.11E+03		5.80E+02	1.30E+03	1.64E+03	3.39E+03	Nutrient	N (c)
Selenium	8 / 8	100	6.60E-01	J	2.20E+00	J	5.90E+00	2.00E+01	1.31E+00	2.00E+00	3.90E+01	N (a)
Sodium	8 / 8	100	2.24E+02	J	6.40E+02	J	5.80E+02	1.30E+03	3.69E+02	NA	Nutrient	N (c)
Thallium	2 / 8	25	5.00E-01	J	2.90E+00		5.80E-01	6.50E+00	1.14E+00	1.30E+00	7.80E-02	Y
Vanadium	7 / 7	100	1.33E+01		2.43E+01		2.90E+00	9.90E+00	1.83E+01	4.09E+01	3.90E+01	N (a)
Zinc	7 / 7	100	3.05E+01	J	5.14E+01		1.20E+00	2.70E+00	4.08E+01	3.22E+02	2.30E+03	N (a)
Explosives												
Dinitrotoluene, 2,6-	1 / 8	13	5.12E-02	J	5.12E-02	J	1.40E-01	1.80E-01	7.52E-02		7.10E-01	N (a)

Note: Exposure point concentrations (EPC) are not provided. The subsurface soil and surface soil data sets are combined for all AP1 soil pathways as "total soil" to evaluate soil exposure for future receptors. EPCs for these receptors are based on total soil. See Table 2.13 of the AP3 BHHRA.
BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
U - Nondetect; sample results from field duplicates may combine a nondetect with a detect.
VQ - Validation qualifier.

Table 5-5

Statistical Summary and Selection of COPCs in Subsurface Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-6

Statistical Summary and Selection of COPCs in Total Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	16 / 16	100	4.76E+03		1.14E+04		1.20E+01	2.90E+01	7.99E+03	1.55E+04	7700		N (b)		---
Antimony	7 / 16	44	5.00E-01	J	2.34E+00	/UJ	3.50E+00	1.20E+01	2.46E+00	9.30E+00	3.1		N (a)		---
Arsenic	16 / 16	100	4.90E+00		4.41E+01		4.70E-01	1.60E+00	1.67E+01	3.65E+01	0.39		Y	2.28E+01	2.28E+01
Barium	16 / 16	100	3.85E+01		2.03E+02		1.20E+01	2.90E+01	8.28E+01	8.26E+02	1500		N (a)		---
Beryllium	16 / 16	100	4.00E-01		2.10E+00		2.90E-01	7.40E-01	9.47E-01	1.00E+00	16		N (a)		---
Cadmium	9 / 16	56	1.40E-01	J	4.40E-01		2.30E-01	4.00E+00	4.74E-01	NA	7		N (a)		---
Calcium	16 / 16	100	2.06E+03		5.28E+04		3.00E+02	7.40E+02	2.34E+04	5.23E+04	Nutrient		N (c)		---
Chromium	16 / 16	100	6.90E+00		1.66E+01		1.20E+00	3.00E+00	1.19E+01	2.90E+01	0.29		N (b)		---
Cobalt	16 / 16	100	4.50E+00		1.22E+01		2.90E+00	7.40E+00	6.87E+00	1.16E+02	2.3		N (b)		---
Copper	16 / 16	100	1.16E+01		1.24E+02		1.50E+00	3.70E+00	2.81E+01	5.62E+01	310		N (a)		---
Iron	16 / 16	100	1.12E+04		6.83E+04		5.80E+00	2.00E+01	2.60E+04	2.34E+05	5500		N (b)		---
Lead	16 / 16	100	3.40E+00	J	2.04E+01		5.90E+00	2.00E+01	9.72E+00	4.86E+01	400		N (a)		---
Magnesium	16 / 16	100	3.43E+02	J	1.75E+04		2.90E+02	7.40E+02	7.05E+03	1.04E+04	Nutrient		N (c)		---
Manganese	16 / 16	100	5.45E+01		1.27E+03		1.10E+00	8.90E+00	3.34E+02	3.51E+03	180		N (b)		---
Mercury	13 / 16	81	1.40E-02	J	1.50E-01		9.00E-02	2.40E-01	5.96E-02	8.50E-02	2.3		N (a)		---
Nickel	16 / 16	100	1.15E+01		3.19E+01		2.30E+00	5.90E+00	1.72E+01	5.51E+01	150		N (a)		---
Potassium	16 / 16	100	5.24E+02	J	2.11E+03		5.80E+02	1.50E+03	1.29E+03	3.39E+03	Nutrient		N (c)		---
Selenium	16 / 16	100	5.90E-01	J	2.90E+00	J	5.90E+00	2.00E+01	1.52E+00	2.00E+00	39		N (a)		---
Sodium	16 / 16	100	1.68E+02	J	6.40E+02	J	5.80E+02	1.50E+03	3.89E+02	NA	Nutrient		N (c)		---
Thallium	3 / 16	19	5.00E-01	J	3.00E+00		5.80E-01	6.50E+00	1.50E+00	1.30E+00	0.078		Y	1.47E+00	1.47E+00
Vanadium	16 / 16	100	1.07E+01		2.89E+01		2.90E+00	9.90E+00	1.95E+01	4.09E+01	39		N (a)		---
Zinc	16 / 16	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.55E+01	3.22E+02	2300		N (a)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	2 / 16	13	1.50E-02	J	4.30E-02	J	2.10E-02	5.00E-02	1.69E-02		0.22		N (a)		---
Explosives															
Dinitrotoluene, 2,6-	4 / 16	25	5.12E-02	J	6.62E-02	JJ	1.40E-01	1.90E-01	7.59E-02		0.71		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 16	6	5.16E-02	J	5.16E-02	J	2.00E-01	4.95E-01	1.49E-01		340	g	N (a)		---
Benzo(a)anthracene	1 / 16	6	1.56E-01	J	1.56E-01	J	2.00E-01	4.95E-01	1.56E-01		0.15		Y	1.81E-01	1.56E-01
Benzo(a)pyrene	1 / 16	6	1.68E-01	J	1.68E-01	J	2.00E-01	4.95E-01	1.56E-01		0.015		Y	1.82E-01	1.68E-01
Benzo(b)fluoranthene	1 / 16	6	2.68E-01		2.68E-01		2.00E-01	4.95E-01	1.63E-01		0.15		Y	1.91E-01	1.91E-01
Benzo(ghi)perylene	1 / 16	6	8.82E-02	J	8.82E-02	J	2.00E-01	4.95E-01	1.51E-01		170	h	N (a)		---
Benzo(k)fluoranthene	1 / 16	6	9.72E-02	J	9.72E-02	J	2.00E-01	4.95E-01	1.52E-01		1.5		N (a)		---
Chrysene	1 / 16	6	1.90E-01	J	1.90E-01	J	2.00E-01	4.95E-01	1.58E-01		15		N (a)		---
Fluoranthene	1 / 16	6	4.01E-01		4.01E-01		2.00E-01	4.95E-01	1.71E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 16	6	9.14E-02	J	9.14E-02	J	2.00E-01	4.95E-01	1.52E-01		0.15		N (a)		---
Phenanthrene	1 / 16	6	1.07E-01	J	1.07E-01	J	2.00E-01	4.95E-01	1.53E-01		170	h	N (a)		---
Pyrene	1 / 16	6	2.73E-01		2.73E-01		2.00E-01	4.95E-01	1.63E-01		170		N (a)		---

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.

Table 5-6

Statistical Summary and Selection of COPCs in Total Soil - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based onEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL softwarer (U.S. Environmental Protection Agency (EPA), 2011, ProUCL Version 4.1.01, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on acenaphthene.
[n] RBSC based on pyrene.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-7

Statistical Summary and Selection of COPCs in Overburden Groundwater - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	RBSC [b] µg/L	COPC? [c,a]	95% UCL [e] µg/L	EPC [f] µg/L	EPC mg/L
Inorganics - Unfiltered														
Aluminum	4 / 6	67	3.49E+01	J	8.89E+01	J	2.00E+01	2.40E+01	4.72E+01	1600	N (a)		---	
Arsenic	3 / 6	50	5.00E+00		9.90E+00	J	1.00E+00	1.00E+00	3.85E+00	0.045	Y	8.02E+00	8.02E+00	8.02E-03
Barium	6 / 6	100	4.01E+01	J	2.20E+02	J	1.00E+00	4.00E+00	9.96E+01	290	N (a)		---	
Calcium	6 / 6	100	1.16E+05		1.61E+05	J	5.00E+01	5.00E+01	1.35E+05	Nutrient	N (b)		---	
Chromium	1 / 6	17	1.30E+00	J	1.30E+00	J	1.00E+00	1.00E+00	1.05E+00	0.031	Y	NA	1.30E+00	1.30E-03
Cobalt	3 / 6	50	1.15E+00	J	2.10E+00	J	1.00E+00	1.00E+00	1.31E+00	0.47	Y	1.75E+00	1.75E+00	1.75E-03
Iron	4 / 6	67	6.41E+01	J	2.24E+03		2.30E+01	3.40E+01	6.07E+02	1100	Y	1.35E+03	1.35E+03	1.35E+00
Magnesium	6 / 6	100	2.68E+04	J	7.16E+04	J	5.00E+01	5.00E+01	5.28E+04	Nutrient	N (b)		---	
Manganese	6 / 6	100	5.20E+01		1.77E+03		1.00E+00	1.00E+00	5.82E+02	32	Y	1.11E+03	1.11E+03	1.11E+00
Nickel	1 / 6	17	2.40E+00	J	2.40E+00	J	1.00E+00	1.00E+00	1.23E+00	30	N (a)		---	
Potassium	6 / 6	100	7.61E+02	J	1.11E+04		5.00E+01	5.00E+01	4.91E+03	Nutrient	N (b)		---	
Sodium	6 / 6	100	1.98E+04		1.54E+05		7.50E+02	3.40E+03	6.04E+04	Nutrient	N (b)		---	
Vanadium	2 / 6	33	2.10E+00	J	2.10E+00	J	1.00E+00	1.00E+00	1.37E+00	7.8	N (a)		---	
Zinc	5 / 6	83	7.60E+00	J	1.84E+01	J	1.00E+00	1.00E+00	1.05E+01	470	N (a)		---	
Explosives														
Nitrotoluene, 2-	1 / 6	17	1.80E-01	J	1.80E-01	J	7.80E-02	1.60E-01	1.23E-01	0.27	N (a)		---	
Volatile Organics														
Acetone	1 / 6	17	1.76E+01	J	1.76E+01	J	1.00E+01	1.00E+01	1.13E+01	1200	N (a)		---	
Chloromethane	1 / 6	17	1.60E+00	J	1.60E+00	J	5.00E-01	5.00E-01	6.83E-01	19	N (a)		---	
Dichloroethane, 1,1-	1 / 6	17	1.65E+00		1.65E+00		2.50E-01	2.50E-01	4.83E-01	2.4	N (a)		---	
Trichloroethane, 1,1,1-	1 / 6	17	2.65E-01	J	2.65E-01	J	2.00E-01	2.00E-01	2.11E-01	750	N (a)		---	
General Chemistry														
Chloride	3 / 3	100	1.75E+03	J	2.70E+04		1.00E+03	5.00E+03	1.33E+04	Nutrient	N (b)		---	
Nitrate-Nitrite	3 / 3	100	5.10E+01	J	5.30E+02		5.00E+01	5.00E+01	3.34E+02	1,000,000 [f]	N (a)		---	
Sulfate	3 / 3	100	1.65E+05	J	5.38E+05		2.00E+03	1.00E+04	3.36E+05	250,000 [g]	Y	NA	5.38E+05	5.38E+02

µg/L - Micrograms per liter.
COPC - Chemical of potential concern.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) tap water values and based on a risk level of 1.0E-06 and a hazard index of 0.1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.
[d] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.1.01 (U.S. Environmental Protection Agency (EPA), 2011, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[e] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[f] Because no Regional Screening Level exists for nitrite-nitrate, 0.1 X the nitrite-nitrate MCL (of 10,000 mg/L) is used for screening.
[g] US Environmental Protection Agency (EPA), 2012, ***2** 012 Edition of the Drinking Water Standards and Health Advisories*, Office of Water, April, EPA 822-R-12-001.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-8

Statistical Summary and Selection of COPCs in Sediment - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	RBSC [a] mg/kg	COPC? [b,c]	EPC [d] mg/kg
Inorganics												
Aluminum	3 / 3	100	2.48E+03	J	7.75E+03		1.80E+01	3.31E+01	4.61E+03	7.70E+04	N (a)	---
Antimony	1 / 3	33	5.40E-01	J	5.40E-01	J	1.50E+00	5.40E+00	7.13E-01	3.10E+01	N (a)	---
Arsenic	3 / 3	100	3.70E+00		6.40E+00		7.20E-01	1.70E+00	5.33E+00	3.90E-01	Y	6.40E+00
Barium	2 / 3	67	2.66E+01		4.78E+01		1.80E+01	3.31E+01	2.99E+01	1.50E+04	N (a)	---
Beryllium	1 / 3	33	2.60E-01	J	2.60E-01	J	4.50E-01	8.30E-01	3.51E-01	1.60E+02	N (a)	---
Cadmium	1 / 3	33	3.00E-01	J	3.00E-01	J	3.05E-01	3.60E-01	2.06E-01	7.00E+01	N (a)	---
Calcium	3 / 3	100	5.09E+03		1.81E+04		4.50E+02	8.28E+02	1.09E+04	Nutrient	N (b)	---
Chromium	3 / 3	100	5.40E+00		1.08E+01		7.55E-01	9.00E-01	7.53E+00	2.90E-01	Y	1.08E+01
Cobalt	1 / 3	33	4.10E+00	J	4.10E+00	J	4.50E+00	8.30E+00	4.01E+00	2.30E+01	N (a)	---
Copper	3 / 3	100	1.44E+01		1.26E+02		2.30E+00	4.10E+00	7.15E+01	3.10E+03	N (a)	---
Iron	3 / 3	100	6.71E+03		1.30E+04	J	9.00E+00	1.66E+01	1.08E+04	5.50E+04	N (a)	---
Lead	3 / 3	100	6.70E+00		1.19E+01		4.55E-01	9.00E+00	9.10E+00	4.00E+02	N (a)	---
Magnesium	3 / 3	100	2.57E+03		5.67E+03		4.50E+02	8.28E+02	4.20E+03	Nutrient	N (b)	---
Manganese	3 / 3	100	1.30E+02	J	3.18E+02		1.40E+00	2.50E+00	1.96E+02	1.80E+03	N (a)	---
Mercury	1 / 3	33	2.70E-02	J	2.70E-02	J	1.40E-01	1.70E-01	6.23E-02	2.30E+01	N (a)	---
Nickel	3 / 3	100	6.55E+00		1.25E+01		3.60E+00	6.60E+00	9.85E+00	1.50E+03	N (a)	---
Potassium	2 / 3	67	3.37E+02	J	1.27E+03		7.59E+02	1.80E+03	6.62E+02	Nutrient	N (b)	---
Selenium	1 / 2	50	1.10E+00		1.10E+00		7.55E-01	8.30E-01	7.39E-01	3.90E+02	N (a)	---
Vanadium	3 / 3	100	6.55E+00	/U	1.93E+01		4.50E+00	8.30E+00	1.24E+01	3.90E+02	N (a)	---
Zinc	3 / 3	100	2.63E+01		5.28E+01	J	1.80E+00	3.30E+00	4.25E+01	2.30E+04	N (a)	---
Semivolatiles Organic Compounds												
Benzo(a)anthracene	1 / 3	33	1.43E-01	J	1.43E-01	J	3.10E-01	5.50E-01	2.23E-01	1.50E-01	N (a)	---
Benzo(a)pyrene	1 / 3	33	1.58E-01	J	1.58E-01	J	3.10E-01	5.50E-01	2.28E-01	1.50E-02	Y	1.58E-01
Benzo(b)fluoranthene	1 / 3	33	2.40E-01	J	2.40E-01	J	3.10E-01	5.50E-01	2.55E-01	1.50E-01	Y	2.40E-01
Benzo(ghi)perylene	1 / 3	33	1.01E-01	J	1.01E-01	J	3.10E-01	5.50E-01	2.09E-01	1.70E+02 e	N (a)	---
Benzo(k)fluoranthene	1 / 3	33	8.05E-02	J	8.05E-02	J	3.10E-01	5.50E-01	2.02E-01	1.50E+00	N (a)	---
Chrysene	1 / 3	33	1.59E-01	J	1.59E-01	J	3.10E-01	5.50E-01	2.28E-01	1.50E+01	N (a)	---
Fluoranthene	1 / 3	33	2.53E-01	J	2.53E-01	J	3.10E-01	5.50E-01	2.59E-01	2.30E+03	N (a)	---
Indeno(1,2,3-cd)pyrene	1 / 3	33	1.11E-01	J	1.11E-01	J	3.10E-01	5.50E-01	2.12E-01	1.50E-01	N (a)	---
Pyrene	1 / 3	33	2.06E-01	J	2.06E-01	J	3.10E-01	5.50E-01	2.44E-01	1.70E+02	N (a)	---

COPC - Chemical of potential concern.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

Table 5-8

Statistical Summary and Selection of COPCs in Sediment - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil and based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.
[d] Exposure-point concentration (EPC) used in risk assessment equal to maximum detected concentration.
[e] RBSC based on pyrene.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-9

Statistical Summary and Selection of COPCs in Surface Water - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentration Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	RBSC [a] µg/L	COPC? [b,c]
Metals											
Calcium	3 / 3	100	24450		27900		5000	5000	26683	Nutrient	N (b)
Magnesium	3 / 3	100	8990		9470		5000	5000	9290	Nutrient	N (b)
Manganese	3 / 3	100	41.65	J	195		15	15	130	320	N (a)
Sodium	2 / 3	67	9740		10350		5000	5000	7530	Nutrient	N (b)

µg/L - Micrograms per liter.
COPC - Chemical of potential concern.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) tap water values and based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-10

Summary of Human Health Risks/Hazards for All Receptors - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

	Current/Future Groundskeeper [a]		Current/Future Construction Worker		Future Indoor Worker		Future Resident[b]			Future Hunter		Future Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Assuming Overburden Groundwater Use													
Exposure Media													
Surface Soil[c]	9.88E-07	0.04	NE	NE	2.65E-07	0.02	NE	NE	NE	6.61E-08	0.002	NA	0.000001
Total Soil[c]	9.65E-07	0.02	4.77E-08	0.07	NE	NE	3.04E-06	0.03	0.26	NE	NE	NE	NE
Groundwater[d]	***4.04E-05***	0.6	NE	NE	***4.04E-05***	0.63	***1.72E-04***	***1.7***	***4.1***	NE	NE	NE	NE
Sediment	NE	NE	2.84E-07	0.08	NE	NE	1.74E-06	0.003	0.03	NE	NE	NE	NE
Surface Water	NE	NE	NA	NA	NE	NE	NA	NA	NA	NE	NE	NE	NE
Total across all media [c]	***4.E-05***	0.7	3.E-07	0.1	***4.E-05***	0.6	***2.E-04***	***2***	***4***	7.E-08	0.002	NA	0.000001
Total across all media except groundwater [e]	1E-06[f]	0.04[h]	5.E-08	0.1	3.E-07	0.02	5.E-06	0.03	0.3	7.E-08	0.002	NA	0.000001

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.
RI - Remedial investigation.

[a]Total ILCR and total HI values for the groundskeeper reflect the respective totals for the future groundskeeper assumed to use either bedrock or overburden groundwater. The total ILCR and HI values for the current groundskeeper are simply those shown for soil. The rounded current groundskeeper ILCR is 1E-6 and the rounded HI is 0.04.
[b]The BHHRA includes both childhood and adult resident exposure scenarios. For noncancer effects, the HI values for childhood exposure and adult exposure are shown separately.
The Total ILCR is the summed ILCR values for both child and adult scenarios which, unlike noncancer HI values, are regarded as additive throughout the lifetime of an individual.
[c]The HI values for surface soil and total soil do not include the contribution of arsenic that were quantified in the BHHRA because arsenic was determined upon further evaluation to be resultant from ambient background conditions.
[d]Exposure to groundwater was assumed for potable use. Based on poor natural quality and limited yield, use of groundwater is regarded as implausible.
[e]Groundwater is excluded because based on poor natural quality and limited yield, use of groundwater is regarded as implausible.
[f]For soil exposure, either surface soil or subsurface soil exposure was assumed in this sum, whichever would lead to a higher Total HI and Total ILCR. Summed totals are rounded to one significant figure.
Notes:
1. *Italics* (non-bolded) apply only to cancer risks and indicate that value exceeds the1E-5 PBOW Project Delivery Team goal.
2. ***Bold italics*** indicates that the noncancer hazard is unacceptable, or that the cancer risk value exceeds the NCP acceptable range (1E-6 to 1E-4).

Source: Ash Pit No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 5-11

Statistical Summary and COPEC Selection for Chemicals Detected in Soil (0 to 6 Feet Below Ground Surface) - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]	Distribution [e]	95% UCL [e] (mg/kg)	EPC [f] (mg/kg)	UCL 0-1' soil depth [g] (mg/kg)	MDC 0-1' soil depth [g] (mg/kg)	EPC 0-1' soil depth [g] (mg/kg)
Inorganics																		
Aluminum	16 / 16	100	4.76E+03		1.14E+04		1.20E+01	2.90E+01	7.99E+03	1.55E+04	pH Dependent	N (b)			---			---
Antimony	7 / 16	44	5.00E-01	J	2.34E+00	/UJ	3.50E+00	1.20E+01	2.46E+00	9.30E+00	0.27	N (b)			---			---
Arsenic	16 / 16	100	4.90E+00		4.41E+01		4.70E-01	1.60E+00	1.67E+01	3.65E+01	18	N (d)			---			---
Barium	16 / 16	100	3.85E+01		2.03E+02		1.20E+01	2.90E+01	8.28E+01	8.26E+02	330	N (a)			---			---
Beryllium	16 / 16	100	4.00E-01		2.10E+00		2.90E-01	7.40E-01	9.47E-01	1.00E+00	21	N (a)			---			---
Cadmium	9 / 16	56	1.40E-01	J	4.40E-01		2.30E-01	4.00E+00	4.74E-01	NA	0.36	Y	Normal	2.63E-01	2.63E-01	3.77E-01	4.40E-01	3.77E-01
Calcium	16 / 16	100	2.06E+03		5.28E+04		3.00E+02	7.40E+02	2.34E+04	5.23E+04	Nutrient	N (c)			---			---
Chromium	16 / 16	100	6.90E+00		1.66E+01		1.20E+00	3.00E+00	1.19E+01	2.90E+01	26	N (a)			---			---
Cobalt	16 / 16	100	4.50E+00		1.22E+01		2.90E+00	7.40E+00	6.87E+00	1.16E+02	13	N (a)			---			---
Copper	16 / 16	100	1.16E+01		1.24E+02		1.50E+00	3.70E+00	2.81E+01	5.62E+01	28	N (d)			---			---
Iron	16 / 16	100	1.12E+04		6.83E+04		5.80E+00	2.00E+01	2.60E+04	2.34E+05	pH Dependent	N (b)			---			---
Lead	16 / 16	100	3.40E+00	J	2.04E+01		5.90E+00	2.00E+01	9.72E+00	4.86E+01	11	N (b)			---			---
Magnesium	16 / 16	100	3.43E+02	J	1.75E+04		2.90E+02	7.40E+02	7.05E+03	1.04E+04	Nutrient	N (c)			---			---
Manganese	16 / 16	100	5.45E+01		1.27E+03		1.10E+00	8.90E+00	3.34E+02	3.51E+03	220	N (b)			---			---
Mercury	13 / 16	81	1.40E-02	J	1.50E-01		9.00E-02	2.40E-01	5.96E-02	8.50E-02	0.00051	N (d)			---			---
Nickel	16 / 16	100	1.15E+01		3.19E+01		2.30E+00	5.90E+00	1.72E+01	5.51E+01	38	N (a)			---			---
Potassium	16 / 16	100	5.24E+02	J	2.11E+03		5.80E+02	1.50E+03	1.29E+03	3.39E+03	Nutrient	N (c)			---			---
Selenium	16 / 16	100	5.90E-01	J	2.90E+00	J	5.90E+00	2.00E+01	1.52E+00	2.00E+00	0.52	N (d)			---			---
Sodium	16 / 16	100	1.68E+02	J	6.40E+02	J	5.80E+02	1.50E+03	3.89E+02	NA	Nutrient	N (c)			---			---
Thallium	3 / 16	19	5.00E-01	J	3.00E+00		5.80E-01	6.50E+00	1.50E+00	1.30E+00	1	Y	Normal	1.47E+00	1.47E+00	2.69E+00	3.00E+00	2.69E+00
Vanadium	16 / 16	100	1.07E+01		2.89E+01		2.90E+00	9.90E+00	1.95E+01	4.09E+01	7.8	N (b)			---			---
Zinc	16 / 16	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.55E+01	3.22E+02	46	N (b)			---			---
Polychlorinated biphenyls (PCB)																		
Aroclor 1260	2 / 16	13	1.50E-02	J	4.30E-02	J	2.10E-02	5.00E-02	1.69E-02		0.371	N (a)			---			---
Explosives																		
Dinitrotoluene, 2,6-	4 / 16	25	5.12E-02	J	6.62E-02	JJ	1.40E-01	1.90E-01	7.59E-02		0.0328	Y	Normal	6.30E-02	6.30E-02	6.58E-02	6.62E-02	6.58E-02
Semivolatile Organic Compounds																		
Acenaphthylene	1 / 16	6	5.16E-02	J	5.16E-02	J	2.00E-01	4.95E-01	1.49E-01		29	N (a)			---			---
Benzo(a)anthracene	1 / 16	6	1.56E-01	J	1.56E-01	J	2.00E-01	4.95E-01	1.56E-01		1.1	N (a)			---			---
Benzo(a)pyrene	1 / 16	6	1.68E-01	J	1.68E-01	J	2.00E-01	4.95E-01	1.56E-01		1.1	N (a)			---			---
Benzo(b)fluoranthene	1 / 16	6	2.68E-01		2.68E-01		2.00E-01	4.95E-01	1.63E-01		1.1	N (a)			---			---
Benzo(ghi)perylene	1 / 16	6	8.82E-02	J	8.82E-02	J	2.00E-01	4.95E-01	1.51E-01		1.1	N (a)			---			---
Benzo(k)fluoranthene	1 / 16	6	9.72E-02	J	9.72E-02	J	2.00E-01	4.95E-01	1.52E-01		1.1	N (a)			---			---
Chrysene	1 / 16	6	1.90E-01	J	1.90E-01	J	2.00E-01	4.95E-01	1.58E-01		1.1	N (a)			---			---
Fluoranthene	1 / 16	6	4.01E-01		4.01E-01		2.00E-01	4.95E-01	1.71E-01		1.1	N (a)			---			---
Indeno(1,2,3-cd)pyrene	1 / 16	6	9.14E-02	J	9.14E-02	J	2.00E-01	4.95E-01	1.52E-01		1.1	N (a)			---			---
Phenanthrene	1 / 16	6	1.07E-01	J	1.07E-01	J	2.00E-01	4.95E-01	1.53E-01		29	N (a)			---			---
Pyrene	1 / 16	6	2.73E-01		2.73E-01		2.00E-01	4.95E-01	1.63E-01		1.1	N (a)			---			---

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NSV - No screening value.
U - Nondetect; sample results from field duplicates may combine a nondetect with a detect.
UCL - Upper confidence limit.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
(d) - Statistical test shows background and site data to be the same; see Appendix C.
[d] Y - Chemical is chosen as COPEC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (U.S. Environmental Protection Agency (EPA), 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm. Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] The EPC for the COPEC at the 0-1 feet soil depth range is used as the exposure concentration for some ecological receptors. Two samples (AP0039 and AP0043) with an end depth slightly greater than 1 foot were also used. See text for details.

Source: Ash Pit No. 3 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

Table 5-12

Statistical Summary and COPEC Selection for Chemicals Detected in Surface Water - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentration Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	ESV [a] µg/L	COPEC? [b,c]	EPC [d] µg/L
Metals												
Calcium	3 / 3	100	24450		27900		5000	5000	2.67E+04	Nutrient	N (b)	---
Magnesium	3 / 3	100	8990		9470		5000	5000	9.29E+03	Nutrient	N (b)	---
Manganese	3 / 3	100	41.65	J	195		15	15	1.30E+02	1.20E+02	Y	1.95E+02
Sodium	2 / 3	67	9740		10350		5000	5000	7.53E+03	Nutrient	N (b)	---

µg/L - Micrograms per liter.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
RI - Remedial investigation.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] ESVs and their sources are in Appendix B of the SLERA.
[b] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPEC.
[d] Concentration used in risk assessment equal to maximum detected concentration.

Source: Ash Pit No. 3 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

Table 5-13

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	ESV [b] mg/kg	COPEC? [c,d]	EPC [e] mg/kg
Inorganics													
Aluminum	3 / 3	100	2.48E+03	J	7.75E+03		1.80E+01	3.31E+01	4.61E+03	1.55E+04	NSV	N (b)	---
Antimony	1 / 3	33	5.40E-01	J	5.40E-01	J	1.50E+00	5.40E+00	7.13E-01	9.30E+00	NSV	N (b)	---
Arsenic	3 / 3	100	3.70E+00		6.40E+00		7.20E-01	1.70E+00	5.33E+00	3.65E+01	9.79E+00	N (a)	---
Barium	2 / 3	67	2.66E+01		4.78E+01		1.80E+01	3.31E+01	2.99E+01	8.26E+02	NSV	N (b)	---
Beryllium	1 / 3	33	2.60E-01	J	2.60E-01	J	4.50E-01	8.30E-01	3.51E-01	1.00E+00	NSV	N (b)	---
Cadmium	1 / 3	33	3.00E-01	J	3.00E-01	J	3.05E-01	3.60E-01	2.06E-01	NA	9.90E-01	N (a)	---
Calcium	3 / 3	100	5.09E+03		1.81E+04		4.50E+02	8.28E+02	1.09E+04	5.23E+04	Nutrient	N (c)	---
Chromium	3 / 3	100	5.40E+00		1.08E+01		7.55E-01	9.00E-01	7.53E+00	2.90E+01	4.34E+01	N (a)	---
Cobalt	1 / 3	33	4.10E+00	J	4.10E+00	J	4.50E+00	8.30E+00	4.01E+00	1.16E+02	5.00E+01	N (a)	---
Copper	3 / 3	100	1.44E+01		1.26E+02		2.30E+00	4.10E+00	7.15E+01	5.62E+01	3.16E+01	Y	1.26E+02
Iron	3 / 3	100	6.71E+03		1.30E+04	J	9.00E+00	1.66E+01	1.08E+04	2.34E+05	Nutrient	N (c)	---
Lead	3 / 3	100	6.70E+00		1.19E+01		4.55E-01	9.00E+00	9.10E+00	4.86E+01	3.58E+01	N (a)	---
Magnesium	3 / 3	100	2.57E+03		5.67E+03		4.50E+02	8.28E+02	4.20E+03	1.04E+04	Nutrient	N (c)	---
Manganese	3 / 3	100	1.30E+02	J	3.18E+02		1.40E+00	2.50E+00	1.96E+02	3.51E+03	4.60E+02	N (a)	---
Mercury	1 / 3	33	2.70E-02	J	2.70E-02	J	1.40E-01	1.70E-01	6.23E-02	8.50E-02	1.80E-01	N (a)	---
Nickel	3 / 3	100	6.55E+00		1.25E+01		3.60E+00	6.60E+00	9.85E+00	5.51E+01	2.27E+01	N (a)	---
Potassium	2 / 3	67	3.37E+02	J	1.27E+03		7.59E+02	1.80E+03	6.62E+02	3.39E+03	Nutrient	N (c)	---
Selenium	1 / 2	50	1.10E+00		1.10E+00		7.55E-01	8.30E-01	7.39E-01	2.00E+00	NSV	N (b)	---
Vanadium	3 / 3	100	6.55E+00	/U	1.93E+01		4.50E+00	8.30E+00	1.24E+01	4.09E+01	NSV	N (b)	---
Zinc	3 / 3	100	2.63E+01		5.28E+01	J	1.80E+00	3.30E+00	4.25E+01	3.22E+02	1.21E+02	N (a)	---
Semivolatiles Organic Compounds													
Benzo(a)anthracene	1 / 3	33	1.43E-01	J	1.43E-01	J	3.10E-01	5.50E-01	2.23E-01		1.08E-01	Y	1.43E-01
Benzo(a)pyrene	1 / 3	33	1.58E-01	J	1.58E-01	J	3.10E-01	5.50E-01	2.28E-01		1.50E-01	Y	1.58E-01
Benzo(b)fluoranthene	1 / 3	33	2.40E-01	J	2.40E-01	J	3.10E-01	5.50E-01	2.55E-01		1.04E+01	N (a)	---
Benzo(ghi)perylene	1 / 3	33	1.01E-01	J	1.01E-01	J	3.10E-01	5.50E-01	2.09E-01		1.70E-01	N (a)	---
Benzo(k)fluoranthene	1 / 3	33	8.05E-02	J	8.05E-02	J	3.10E-01	5.50E-01	2.02E-01		2.40E-01	N (a)	---
Chrysene	1 / 3	33	1.59E-01	J	1.59E-01	J	3.10E-01	5.50E-01	2.28E-01		1.66E-01	N (a)	---
Fluoranthene	1 / 3	33	2.53E-01	J	2.53E-01	J	3.10E-01	5.50E-01	2.59E-01		4.23E-01	N (a)	---
Indeno(1,2,3-cd)pyrene	1 / 3	33	1.11E-01	J	1.11E-01	J	3.10E-01	5.50E-01	2.12E-01		2.00E-01	N (a)	---
Pyrene	1 / 3	33	2.06E-01	J	2.06E-01	J	3.10E-01	5.50E-01	2.44E-01		1.95E-01	Y	2.06E-01

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
NSV - No screening value available.
RI - Remedial investigation.
VQ - Validation qualifier.
[a] Soil background screening concentrations are used for sediment. See text for details.
[b] ESVs and their sources are in Appendix B of the SLERA.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPEC.
[e] Concentration used in risk assessment equal to maximum detected concentration.

Source: Ash Pit No. 3 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

Table 5-14

Ecological Hazard Quotients for All Assessment Receptors - AP3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

COPEC	Deer Mouse		Short-tailed Shrew		Cottontail Rabbit		Marsh Wren		White-tailed Deer		Raccoon		Red-Tailed Hawk		Muskrat	
	NOAEL[a]	LOAEL[b]	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Metals																
Cadmium	3.25E-01	3.25E-02	4.24E-01	4.24E-02	8.61E-03	8.61E-04	7.64E-01	5.54E-02	1.56E-05	1.56E-06	3.30E-04	3.30E-05	7.39E-06	NA	0.00E+00	0.00E+00
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-04	2.12E-04	0.00E+00	NA	3.36E-01	2.60E-01
Manganese	3.29E-04	1.02E-04	3.40E-04	1.05E-04	5.62E-05	1.74E-05	5.39E-05	5.39E-06	2.27E-07	7.04E-08	3.87E-06	1.20E-06	1.14E-08	NA	2.08E-04	6.43E-05
Thallium	**9.51E+00**	9.51E-01	**1.18E+01**	1.18E+00	5.25E-01	5.25E-02	7.13E-01	7.13E-02	2.26E-04	2.26E-05	1.38E-02	1.38E-03	6.28E-05	NA	0.00E+00	0.00E+00
Explosives																
2,6-Dinitrotoluene	1.79E-02	2.38E-03	9.42E-03	1.26E-03	3.18E-03	4.24E-04	3.27E-03	1.29E-04	6.36E-06	8.48E-07	1.36E-05	1.81E-06	1.08E-07	NA	0.00E+00	0.00E+00
Semivolatile Organics																
Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-05	1.45E-06	0.00E+00	NA	6.29E-03	6.29E-04
Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-05	1.71E-06	0.00E+00	NA	6.31E-03	6.31E-04
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-06	7.44E-07	0.00E+00	NA	5.93E-03	1.19E-03

COPEC - Chemical of potential ecological concern.
LOAEL - Lowest-observed-adverse-effect level.
NA - Because the red-tailed hawk represents a threatened and endangered species observed at the site (bald eagle), only hazard quotients based on the NOAEL are calculated.
NOAEL - No-observed-adverse-effect level.

[a]Ecological hazard quotient (EHQ) value is based on the more-stringent NOAEL toxicity value.
[b]EHQ value is based on the less-stringent LOAEL toxicity value.
RI - Remedial investigation.

Notes:
1. EHQ values that are 1 or less reflect a minimal potential for adverse ecological effects. HQ values greater than 1 to but not exceeding 10 indicate a low potential for adverse ecological effects, and those ranging from 10 through 100 are regarded as having a significant potential for adverse ecological effects. Values greater than 100 have the highest potential for adverse ecological effects.
2. EHQ values exceeding a value of 1 indicate a potential for adverse effects, but should not be interpreted as an indication that even one individual among the receptor population has expressed a toxicological effect resulting from exposure. Thus, an HQ greater than a value of 1, even much greater, should not be interpreted as a definitive indication of toxicological effects to an individual, much less adverse ecological effects to a population.
3. Shaded cells indicate an EHQ value greater than 1 (when rounded to the one significant figure).
4. Thallium is the only COPEC with an associated EHQ that exceeds a value of 1 (when rounded to one significant figure). This EHQ exceedance applies only to the mouse and shrew, and only under the EHQ that is based on the stringent NOAEL value. The EHQ values for these receptors that are based on the less-stringent LOAEL values are equal to or less than 1, indicating minimal potential for adverse ecological effects.

Source: Ash Pit No. 3 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

Table 6-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY3-SB01										CY3-SB02					
				SAMPLE NO	CY0031		CY0032		CY0033		CY0034		CY0035		CY0036		CY0037		CY0038	
				DATE	12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011	
				DEPTH	0.2 - 1.2 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft		1.5 - 2.5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		FD		FS		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.0657	0.0657	J	-	-	-	-	-	-	-	-	0.0619	J	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.171	0.171	J	-	-	-	-	-	-	-	-	0.0738	J	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	0.407	0.407		-	-	-	-	-	-	-	-	0.348		-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.403	0.326		-	-	-	-	-	-	-	-	0.403		-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.582	0.414		-	-	-	-	-	-	-	-	0.582		-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.277	0.203		-	-	-	-	-	-	-	-	0.277		-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.188	0.163	J	-	-	-	-	-	-	-	-	0.188	J	-	-	-	-
Chrysene	mg/kg	15	NE	0.443	0.387		-	-	-	-	-	-	-	-	0.443		-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.015	NE	0.0589	0.0416	J	-	-	-	-	-	-	-	-	0.0589	J	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.843	0.843		-	-	-	-	-	-	-	-	0.662		-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.294	0.223		-	-	-	-	-	-	-	-	0.294		-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.021	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.415	0.415		-	-	-	-	-	-	-	-	0.249		-	-	-	-
Pyrene	mg/kg	170	NE	0.636	0.636		-	-	-	-	-	-	-	-	0.508		-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	11,400	7,110		11,400		11,400		8,700		6,040		4,130		8,230		6,530	
Antimony	mg/kg	3.1	9.3	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15	J
Arsenic	mg/kg	0.39	36.5	12.9	8.8		8.7		12.9		4.2		8.6		3.6		7.5		5.6	
Barium	mg/kg	1,500	826	70.7	44.7		64.3		70.7		61		53.2		19.3		58.2		50.2	
Beryllium	mg/kg	16	1	0.7	0.42	J	0.7	J	0.61	J	0.18	J	0.3		0.19	J	0.49		0.38	
Cadmium	mg/kg	7	NE	0.61	0.16	J	-	-	-	-	0.054	J	0.11	J	-	-	-	-	0.42	
Calcium	mg/kg	NE	52,300	68,000	20,200		2,740		3,260		2,700		40,300		68,000		2,340		14,000	
Chromium	mg/kg	NE	29	17.2	9.6		15.6		17.2		12		10.7		6.7		12.1		9.4	
Cobalt	mg/kg	2.3	116	9	8.1		8.6	J	8.4	J	6		5.5		2.7		5.9		6.1	
Copper	mg/kg	310	56.2	19.5	15.2		13.2		19.5		9.2		14.3		7.4		12.2		13	
Iron	mg/kg	5,500	234,000	25,800	14,500		18,700		25,800		14,000		11,600		6,480		15,000		12,100	
Lead	mg/kg	40	48.6	12.8	11		8.6		9.7		5.7		9.7		5.8		9.3		9.7	
Magnesium	mg/kg	NE	10,400	12,900	5,920		2,250		1,970		2,000	B	**12,000**		5,020		1,600		6,010	
Manganese	mg/kg	180	3,506	436	316		426		291		230		274		240		251		269	
Mercury	mg/kg	1	0.09	0.05	0.029	J	0.021	J	0.049	J	0.022	J	0.013	J	0.03	J	0.033	J	0.022	J
Nickel	mg/kg	150	55.1	23.9	19.8		19.6		23.9		13		14.8		5.8		15.6		14.6	
Potassium	mg/kg	NE	3,390	1,010	755	J	697	J	598	J	550	J	982		273	J	478	J	465	J
Sodium	mg/kg	NE	NE	92.1	-	-	-	-	-	-	-	-	91.5	J	57	J	-	-	55.7	J
Thallium	mg/kg	0.078	1.3	1	-	-	-	-	-	-	1	J	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	33.4	16.2		27.3		33.4		19		12.2		10.7		23.7		16.2	
Zinc	mg/kg	2,300	321.75	50.4	48.9		38.5		50.4		30		38.3		14.6		30.9		29	
GENERAL CHEMISTRY																				
Total organic carbon	Percent	NE	NE	0.66	0.66		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY3-SB03						CY3-SB04					
				SAMPLE NO	CY0039		CY0040		CY0041		CY0042		CY0043		CY0044	
				DATE	12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011	
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																
Acenaphthylene	mg/kg	NE	NE	0.0657	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.171	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	0.407	0.0366	J	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.403	0.032	J	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.582	0.0291	J	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.277	0.0224	J	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.188	0.0269	J	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.443	0.0406	J	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.015	NE	0.0589	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.843	0.0525	J	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.294	0.0255	J	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.021	0.021	J	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.415	0.0278	J	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.636	0.0438	J	-	-	-	-	-	-	-	-	-	-
METALS																
Aluminum	mg/kg	7,700	15,500	11,400	5,780		7,270	J	7,100		4,640		8,390		7,330	
Antimony	mg/kg	3.1	9.3	0.29	-	-	-	-	0.29	J	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	12.9	7.2		3.7	J	4.8		4.9		7.8		7.3	
Barium	mg/kg	1,500	826	70.7	37.4		51	J	46.1		42.4		66.3		59.6	
Beryllium	mg/kg	16	1	0.7	0.3		0.38	J	0.37		0.25		0.49	J	0.38	
Cadmium	mg/kg	7	NE	0.61	0.18	J	0.26	J	0.61		0.14	J	-	-	0.21	J
Calcium	mg/kg	NE	52,300	68,000	38,500		2,850	J	28,500		31,800		2,860		42,700	
Chromium	mg/kg	NE	29	17.2	10.3		9.1	J	10.4		8.6		12.6		14.3	
Cobalt	mg/kg	2.3	116	9	6.7		3.6	J	6.2		4.7		6.7		9	
Copper	mg/kg	310	56.2	19.5	14.7		10.5	J	16.1		12		15.7		18.9	
Iron	mg/kg	5,500	234,000	25,800	12,100		9,520	J	13,600		8,830		16,400		13,900	
Lead	mg/kg	40	48.6	12.8	10		9.4	J	10		9.9		9.4		12.8	
Magnesium	mg/kg	NE	10,400	12,900	10,900		1,450	J	9,740		9,390		1,990		**12,900**	
Manganese	mg/kg	180	3,506	436	325		158	J	346		236		436		400	
Mercury	mg/kg	1	0.09	0.05	0.018	J	0.05	J	0.019	J	0.02	J	0.034	J	0.015	J
Nickel	mg/kg	150	55.1	23.9	17.5		8.8	J	17.3		12		18.7		21.6	
Potassium	mg/kg	NE	3,390	1,010	921		387	J	929		558		454	J	1,010	
Sodium	mg/kg	NE	NE	92.1	92.1	J	-	-	76.9	J	70	J	-	-	89.1	J
Thallium	mg/kg	0.078	1.3	1	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	33.4	13.5		16.3	J	15.6		10.6		22.4		16	
Zinc	mg/kg	2,300	321.75	50.4	38.7		25.9	J	38		33.3		39.3		48.5	
GENERAL CHEMISTRY																
Total organic carbon	Percent	NE	NE	0.66	-	-	-	-	-	-	-	-	-	-	-	-

Table 6-1

Detections Above RBSCs and/or BSCs in Surface and Subsurface Soil Samples - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

mg/kg - Milligrams per kilogram.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
BSC - Background screening concentration.
MDC - Maximum detected concentration for the area of concern.
Shaded cell indicates value is greater than RBSC.
Bolded text indicates values are greater than BSC.
NE - Not established (RBSCs), not evaluated (BSCs).
"-" - Not detected.
RI - Remedial investigation.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 6-2

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Method Detection Limit Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	EPC[e] mg/kg
Inorganics														
Aluminum	4 / 4	100	4.13E+03		7.11E+03		7.30E-01	1.80E+00	5.42E+03	1.55E+04	7700		N (b)	
Arsenic	4 / 4	100	3.60E+00		8.80E+00		3.70E-02	8.80E-02	6.13E+00	3.65E+01	0.39		N (b)	
Barium	4 / 4	100	1.93E+01		4.47E+01		3.70E-02	8.80E-02	3.60E+01	8.26E+02	1500		N (b)	
Beryllium	4 / 4	100	1.90E-01	J	4.20E-01	J	3.70E-03	8.80E-03	2.90E-01	1.00E+00	16		N (b)	
Cadmium	3 / 4	75	1.40E-01	J	1.80E-01	J	7.30E-03	2.00E-02	1.25E-01	NA	7		N (b)	
Calcium	4 / 4	100	2.02E+04		6.80E+04		3.70E+00	9.80E+00	3.96E+04	5.23E+04	Nutrient		N (c)	
Chromium	4 / 4	100	6.70E+00		1.03E+01		7.30E-02	2.00E-01	8.80E+00	2.90E+01	0.29		N (b)	
Cobalt	4 / 4	100	2.70E+00		8.10E+00		3.70E-02	8.80E-02	5.55E+00	1.16E+02	2.3		N (b)	
Copper	4 / 4	100	7.40E+00		1.52E+01		3.70E-02	8.80E-02	1.23E+01	5.62E+01	310		N (b)	
Iron	4 / 4	100	6.48E+03		1.45E+04		1.20E+00	3.00E+00	1.05E+04	2.34E+05	5500		N (b)	
Lead	4 / 4	100	5.80E+00		1.10E+01		4.40E-02	2.00E-01	9.18E+00	4.86E+01	400		N (b)	
Magnesium	4 / 4	100	5.02E+03		1.09E+04		1.80E+00	4.40E+00	7.81E+03	1.04E+04	Nutrient		N (c)	
Manganese	4 / 4	100	2.36E+02		3.25E+02		3.70E-02	8.80E-02	2.79E+02	3.51E+03	180		N (b)	
Mercury	4 / 4	100	1.80E-02	J	3.00E-02	J	6.50E-03	7.10E-03	2.43E-02	8.50E-02	2.3		N (b)	
Nickel	4 / 4	100	5.80E+00		1.98E+01		3.70E-02	8.80E-02	1.38E+01	5.51E+01	150		N (b)	
Potassium	4 / 4	100	2.73E+02	J	9.21E+02		1.80E+00	4.40E+00	6.27E+02	3.39E+03	Nutrient		N (c)	
Sodium	3 / 4	75	5.70E+01	J	9.21E+01	J	2.70E+01	6.60E+01	7.13E+01	NA	Nutrient		N (c)	
Vanadium	4 / 4	100	1.06E+01		1.62E+01		3.70E-02	8.80E-02	1.28E+01	4.09E+01	39		N (b)	
Zinc	4 / 4	100	1.46E+01		4.89E+01		7.30E-02	2.00E-01	3.39E+01	3.22E+02	2300		N (b)	
Semivolatile Organic Compounds														
Acenaphthylene	2 / 4	50	6.19E-02	J	6.57E-02	J	1.90E-02	2.00E-02	4.19E-02		340	f	N (a)	
Anthracene	2 / 4	50	7.38E-02	J	1.71E-01	J	1.90E-02	2.00E-02	7.12E-02		1700		N (a)	
Benzo(a)anthracene	3 / 4	75	3.66E-02	J	4.07E-01		1.90E-02	2.00E-02	2.03E-01		0.15		Y	0.407
Benzo(a)pyrene	3 / 4	75	3.20E-02	J	4.03E-01		1.90E-02	2.00E-02	1.95E-01		0.015		Y	0.403
Benzo(b)fluoranthene	3 / 4	75	2.91E-02	J	5.82E-01		1.90E-02	2.00E-02	2.61E-01		0.15		Y	0.582
Benzo(ghi)perylene	3 / 4	75	2.24E-02	J	2.77E-01		1.90E-02	2.00E-02	1.31E-01		170	g	N (a)	
Benzo(k)fluoranthene	3 / 4	75	2.69E-02	J	1.88E-01	J	1.90E-02	2.00E-02	9.95E-02		1.5		N (a)	
Chrysene	3 / 4	75	4.06E-02	J	4.43E-01		1.90E-02	2.00E-02	2.23E-01		15		N (a)	
Dibenz(a,h)anthracene	2 / 4	50	4.16E-02	J	5.89E-02	J	1.90E-02	2.00E-02	3.51E-02		0.015		Y	0.0589
Fluoranthene	3 / 4	75	5.25E-02	J	8.43E-01		1.90E-02	2.00E-02	3.94E-01		230		N (a)	
Indeno(1,2,3-cd)pyrene	3 / 4	75	2.55E-02	J	2.94E-01		1.90E-02	2.00E-02	1.41E-01		0.15		Y	0.294
Methylnaphthalene, 2-	1 / 4	25	2.10E-02	J	2.10E-02	J	1.90E-02	2.00E-02	2.00E-02		23		N (a)	
Phenanthrene	3 / 4	75	2.78E-02	J	4.15E-01		1.90E-02	2.00E-02	1.78E-01		170	g	N (a)	
Pyrene	3 / 4	75	4.38E-02	J	6.36E-01		1.90E-02	2.00E-02	3.02E-01		170		N (a)	

Table 6-2

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg										
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]		EPC[e]
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]	mg/kg

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = Maximum detected concentration is less than the RBSC.
(b) = Maximum detected concentration is less than the BSC.
(c) = Essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] The maximum detected concentration is used as the exposure point concentration (EPC) because the data sets have fewer than five samples.
[f] RBSC based on acenapthene.
[g] RBSC based on pyrene.

Source: Coal Yard No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 6-3

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	6.04E+03		1.14E+04		9.30E-01	5.50E+00	7.79E+03	1.55E+04	7700	N (b)
Antimony	2 / 8	25	1.50E-01	J	2.90E-01	J	5.00E-02	2.75E-01	1.49E-01	9.30E+00	3.1	N (b)
Arsenic	8 / 8	100	3.70E+00	J	1.08E+01		4.60E-02	2.75E-01	7.01E+00	3.65E+01	0.39	N (b)
Barium	8 / 8	100	4.61E+01		6.75E+01		4.60E-02	2.75E-01	5.65E+01	8.26E+02	1500	N (b)
Beryllium	8 / 8	100	3.00E-01		6.55E-01	J	4.60E-03	2.75E-02	4.31E-01	1.00E+00	16	N (b)
Cadmium	5 / 8	63	1.10E-01	J	6.10E-01		5.00E-03	2.75E-02	2.07E-01	NA	7	N (b)
Calcium	8 / 8	100	2.34E+03		4.27E+04		2.50E+00	1.40E+01	1.71E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	9.10E+00	J	1.64E+01		5.00E-02	2.75E-01	1.19E+01	2.90E+01	0.29	N (b)
Cobalt	8 / 8	100	3.60E+00	J	9.00E+00		4.60E-02	2.75E-01	6.44E+00	1.16E+02	2.3	N (b)
Copper	8 / 8	100	1.05E+01	J	1.89E+01		4.60E-02	2.75E-01	1.46E+01	5.62E+01	310	N (b)
Iron	8 / 8	100	9.52E+03	J	2.23E+04		1.60E+00	9.55E+00	1.43E+04	2.34E+05	5500	N (b)
Lead	8 / 8	100	9.15E+00		1.28E+01		4.70E-02	1.10E-01	9.93E+00	4.86E+01	400	N (b)
Magnesium	8 / 8	100	1.45E+03	J	1.29E+04		2.30E+00	1.40E+01	5.98E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.58E+02	J	4.36E+02		4.60E-02	2.75E-01	3.12E+02	3.51E+03	180	N (b)
Mercury	8 / 8	100	1.30E-02	J	5.00E-02	J	6.50E-03	7.80E-03	2.76E-02	8.50E-02	2.3	N (b)
Nickel	8 / 8	100	8.80E+00	J	2.18E+01		4.60E-02	2.75E-01	1.66E+01	5.51E+01	150	N (b)
Potassium	8 / 8	100	3.87E+02	J	1.01E+03		2.30E+00	1.40E+01	6.69E+02	3.39E+03	Nutrient	N (c)
Sodium	4 / 8	50	5.57E+01	J	9.15E+01	J	3.50E+01	2.05E+02	9.00E+01	NA	Nutrient	N (c)
Vanadium	8 / 8	100	1.22E+01		3.04E+01		4.60E-02	2.75E-01	1.91E+01	4.09E+01	39	N (b)
Zinc	8 / 8	100	2.59E+01	J	4.85E+01		5.00E-02	2.75E-01	3.68E+01	3.22E+02	2300	N (b)

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk based screening concentration.
RI - Remedial investigation.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = Maximum detected concentration is less than the RBSC.
(b) = Maximum detected concentration is less than the BSC.
(c) = Essential nutrient.
[d] Y = Chemical is chosen as COPC.

Source: Coal Yard No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 6-4

Summary of Human Health Risks/Hazards for All Receptors - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

	Current/Future Groundskeeper		Current/Future Construction Worker		Future Indoor Worker		Future Resident[a]			Future Hunter		Future Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Surface Soil	2.81E-06	NA	NE	NE	7.53E-07	NA	NE	NE	NE	1.88E-07	NA	NA	NA
Total Soil [b]	2.81E-06	NA	1.39E-07	NA	NE	NE	8.84E-06	NA	NA	NE	NE	NE	NE

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.
RI - Remedial investigation.

[a]The BHHRA includes both childhood and adult resident exposure scenarios. For noncancer effects, the HI values for childhood exposure and adult exposure are shown separately.
The total ILCR (see footnote d) is the summed ILCR values for both child and adult scenarios which, unlike noncancer HI values, are regarded as additive throughout the lifetime of an individual.
[b] Total soil ILCR and HI values are based on use of surface soil maximum detected concentrations as exposure-point concentration values because no chemicals of potential concern were identified for subsurface soil.

Note:
None of the HI values exceeded the target value of 1 and none of the ILCR values exceeded the NCP acceptable cancer risk range or the 1E-5 PBOW Project Delivery Team cancer risk goal.

Source: Coal Yard No. 3 Baseline Human Health Risk Assessment (BHHRA) (Shaw, 2013).

Table 6-5

Statistical Summary and COPEC Selection of Chemicals Detected in Soil (0 to 6 feet bgs) - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values (mg/kg) Detected Concentrations Minimum	VQ	Maximum	VQ	Method Detection Limit Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]
Inorganics												
Aluminum	8 / 8	100	4.13E+03		1.14E+04		7.30E-01	5.50E+00	7.12E+03	1.55E+04	pH Dependent	N (b)
Arsenic	8 / 8	100	3.60E+00		1.08E+01		3.70E-02	2.75E-01	6.79E+00	3.65E+01	18	N (a)
Barium	8 / 8	100	1.93E+01		6.75E+01		3.70E-02	2.75E-01	4.84E+01	8.26E+02	330	N (a)
Beryllium	8 / 8	100	1.90E-01	J	6.55E-01	J	3.70E-03	2.75E-02	3.97E-01	1.00E+00	21	N (a)
Cadmium	4 / 8	50	1.40E-01	J	2.60E-01	J	5.60E-03	2.75E-02	1.01E-01	NA	0.36	N (a)
Calcium	8 / 8	100	2.34E+03		6.80E+04		2.80E+00	1.40E+01	2.12E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	6.70E+00		1.64E+01		5.60E-02	2.75E-01	1.07E+01	2.90E+01	26	N (a)
Cobalt	8 / 8	100	2.70E+00		8.50E+00	J	3.70E-02	2.75E-01	5.86E+00	1.16E+02	13	N (a)
Copper	8 / 8	100	7.40E+00		1.64E+01		3.70E-02	2.75E-01	1.30E+01	5.62E+01	28	N (a)
Iron	8 / 8	100	6.48E+03		2.23E+04		1.20E+00	9.55E+00	1.31E+04	2.34E+05	pH Dependent	N (b)
Lead	8 / 8	100	5.80E+00		1.10E+01		4.40E-02	2.00E-01	9.24E+00	4.86E+01	11	N (b)
Magnesium	8 / 8	100	1.45E+03	J	1.09E+04		1.80E+00	1.40E+01	4.80E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.58E+02	J	4.36E+02		3.70E-02	2.75E-01	2.90E+02	3.51E+03	220	N (b)
Mercury	8 / 8	100	1.80E-02	J	5.00E-02	J	6.50E-03	7.20E-03	3.11E-02	8.50E-02	0.00051	N (b)
Nickel	8 / 8	100	5.80E+00		2.18E+01		3.70E-02	2.75E-01	1.50E+01	5.51E+01	38	N (a)
Potassium	8 / 8	100	2.73E+02	J	9.21E+02		1.80E+00	1.40E+01	5.59E+02	3.39E+03	Nutrient	N (c)
Sodium	3 / 8	38	5.70E+01	J	9.21E+01	J	2.70E+01	2.05E+02	8.65E+01	NA	Nutrient	N (c)
Vanadium	8 / 8	100	1.06E+01		3.04E+01		3.70E-02	2.75E-01	1.80E+01	4.09E+01	7.8	N (b)
Zinc	8 / 8	100	1.46E+01		4.89E+01		5.60E-02	2.75E-01	3.45E+01	3.22E+02	46	N (b)
Semivolatile Organic Compounds												
Acenaphthylene	2 / 8	25	6.19E-02	J	6.57E-02	J	1.90E-02	2.10E-02	3.11E-02		29	N (a)
Anthracene	2 / 8	25	7.38E-02	J	1.71E-01	J	1.90E-02	2.10E-02	4.57E-02		29	N (a)
Benzo(a)anthracene	3 / 8	38	3.66E-02	J	4.07E-01		1.90E-02	2.10E-02	1.12E-01		1.1	N (a)
Benzo(a)pyrene	3 / 8	38	3.20E-02	J	4.03E-01		1.90E-02	2.10E-02	1.08E-01		1.1	N (a)
Benzo(b)fluoranthene	3 / 8	38	2.91E-02	J	5.82E-01		1.90E-02	2.10E-02	1.41E-01		1.1	N (a)
Benzo(ghi)perylene	3 / 8	38	2.24E-02	J	2.77E-01		1.90E-02	2.10E-02	7.54E-02		1.1	N (a)
Benzo(k)fluoranthene	3 / 8	38	2.69E-02	J	1.88E-01	J	1.90E-02	2.10E-02	5.99E-02		1.1	N (a)
Chrysene	3 / 8	38	4.06E-02	J	4.43E-01		1.90E-02	2.10E-02	1.21E-01		1.1	N (a)
Dibenz(a,h)anthracene	2 / 8	25	4.16E-02	J	5.89E-02	J	1.90E-02	2.10E-02	2.77E-02		1.1	N (a)
Fluoranthene	3 / 8	38	5.25E-02	J	8.43E-01		1.90E-02	2.10E-02	2.07E-01		1.1	N (a)
Indeno(1,2,3-cd)pyrene	3 / 8	38	2.55E-02	J	2.94E-01		1.90E-02	2.10E-02	8.04E-02		1.1	N (a)
Methylnaphthalene, 2-	1 / 8	13	2.10E-02	J	2.10E-02	J	1.90E-02	2.10E-02	2.01E-02		3.24	N (a)
Phenanthrene	3 / 8	38	2.78E-02	J	4.15E-01		1.90E-02	2.10E-02	9.91E-02		29	N (a)
Pyrene	3 / 8	38	4.38E-02	J	6.36E-01		1.90E-02	2.10E-02	1.61E-01		1.1	N (a)

Table 6-5

Statistical Summary and COPEC Selection of Chemicals Detected in Soil (0 to 6 feet bgs) - CY3
Ash Pit No. 1 and Ash Pit No. 3 RI Report
Plum Brook Ordnance Works, Sandusky, Ohio

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RI - Remedial investigation.
UCL - Upper confidence limit.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio,* August.
[b] ESVs and their sources are in Appendix B of the SLERA.
[c] N = Chemical is not chosen as a COPEC:
(a) = maximum detected concentration is less than the ESV.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPEC.

Source: Coal Yard No. 3 Screening Level Ecological Risk Assessment (SLERA) (Shaw, 2013).

FIGURES

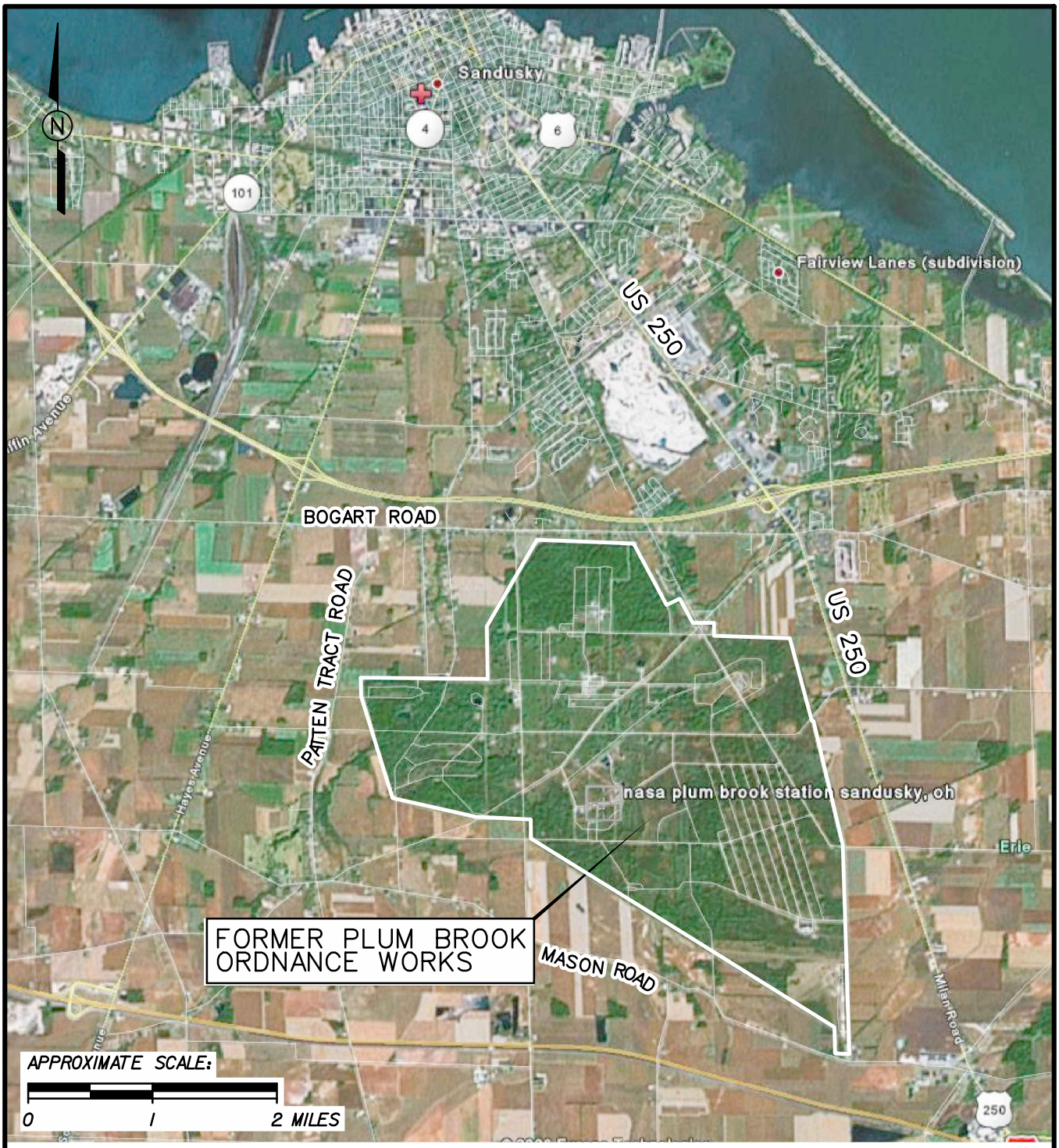

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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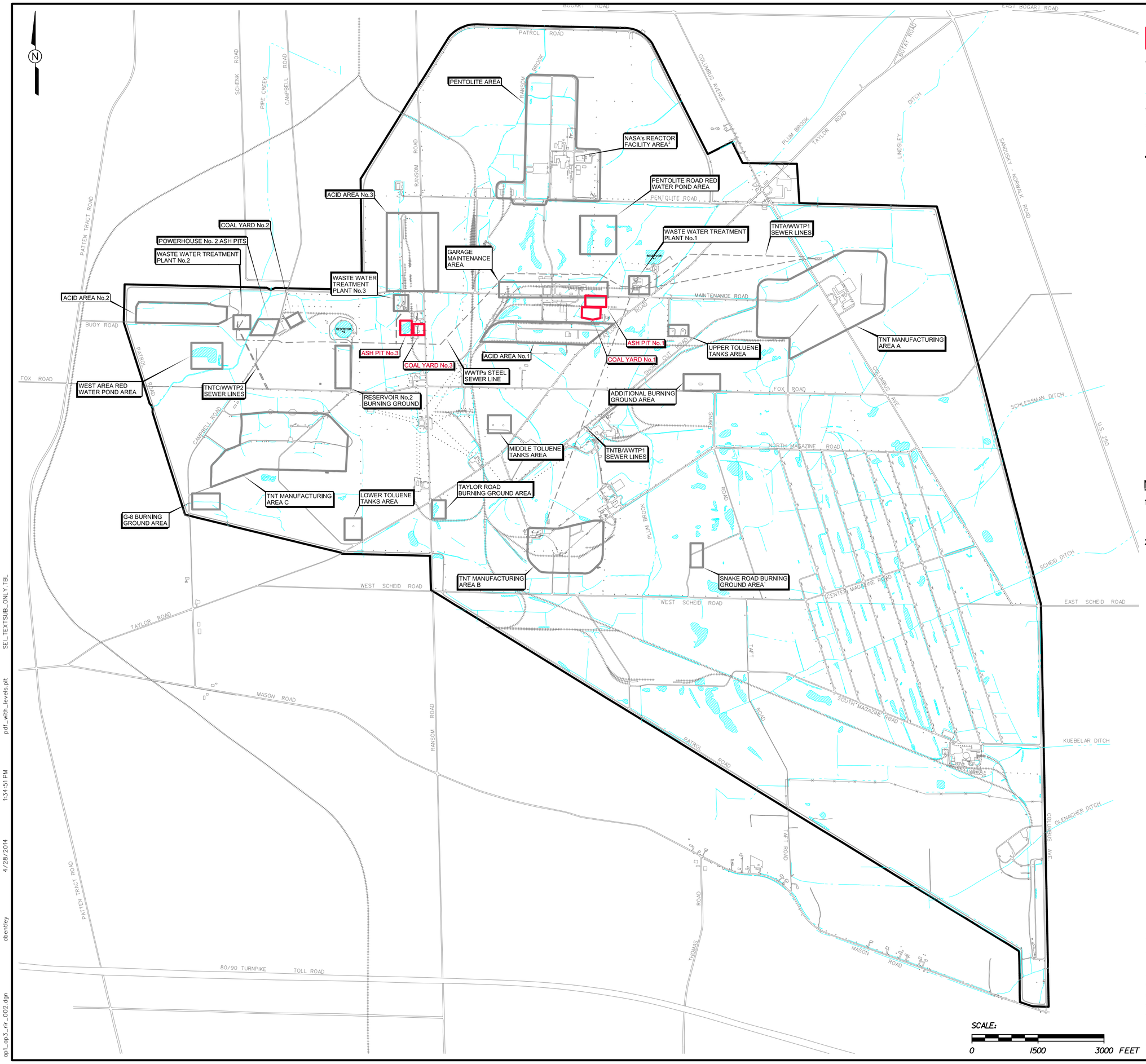

LEGEND:

- AREA OF CONCERN
- APPROXIMATE LOCATION OF SEWER LINES
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY. DEMOLITION OF THE REACTOR WAS COMPLETED BY NASA IN 2012.

SCALE:

0 1500 3000 FEET

FIGURE 1-2

LOCATIONS OF ASH PIT No. 1, COAL YARD No. 1, ASH PIT No. 3, AND COAL YARD No. 3 AT PBOW

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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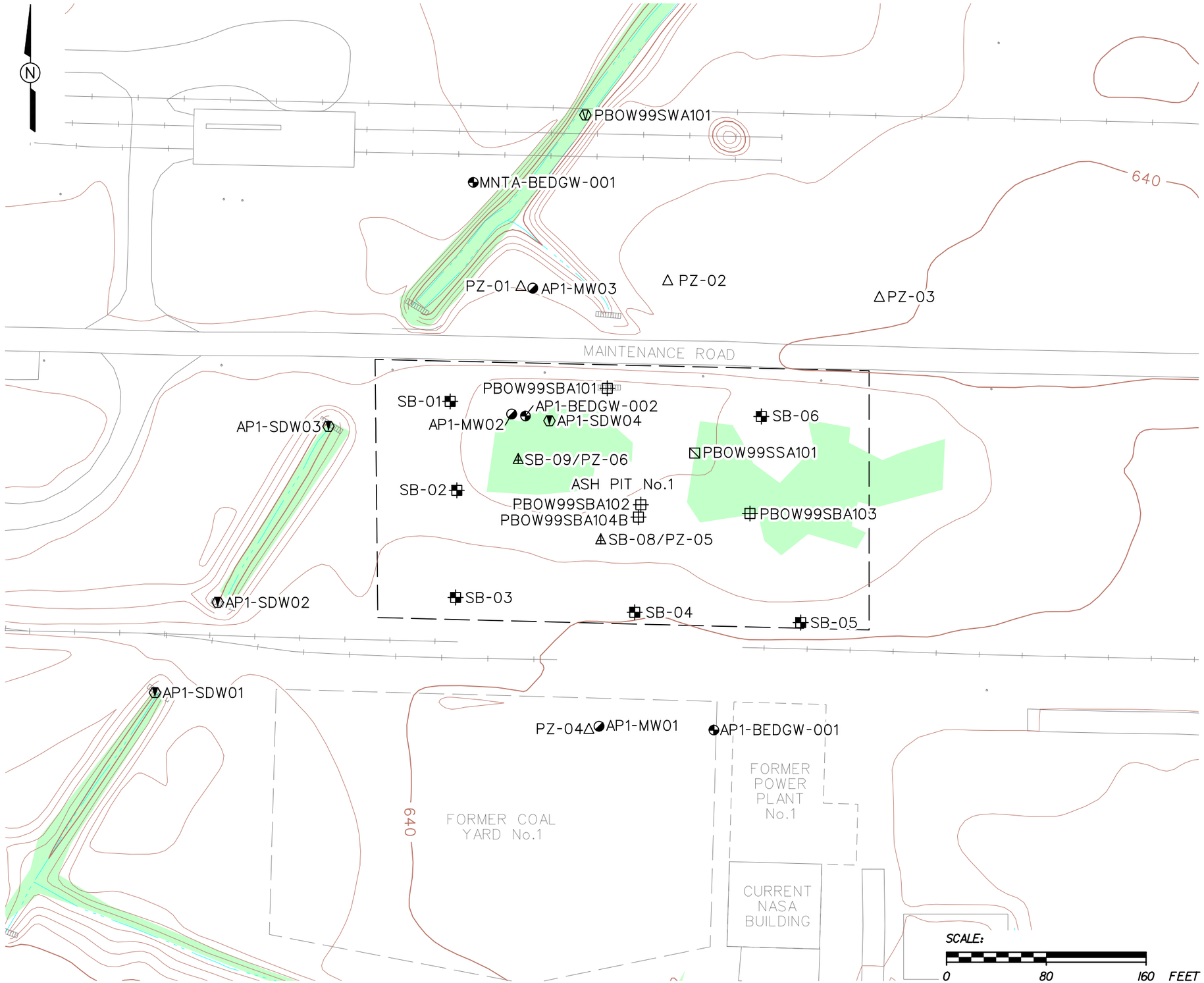

LEGEND:

- PREVIOUS SOIL BORING (USACE, 2000)
- PREVIOUS SURFACE SOIL SAMPLE (USACE, 2000)
- PREVIOUS SURFACE WATER/SEDIMENT SAMPLE (USACE, 2000)
- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)
- IDENTIFIED WETLAND (NOTE 3)

NOTES:

1. PREVIOUS SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).
2. NO BORING LABELED SB-07 WAS DRILLED.
3. WETLAND IDENTIFICATION IS PRELIMINARY PENDING APPROVAL BY THE USACE (ENVIROSCIENCE, 2012). THEREFORE, THEY ARE NOT JURISDICTIONAL WETLANDS AND ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY.

FIGURE 3-1
GENERAL SITE FEATURES OF ASH PIT No. 1 WITH SITE TOPOGRAPHY AND SAMPLING LOCATIONS

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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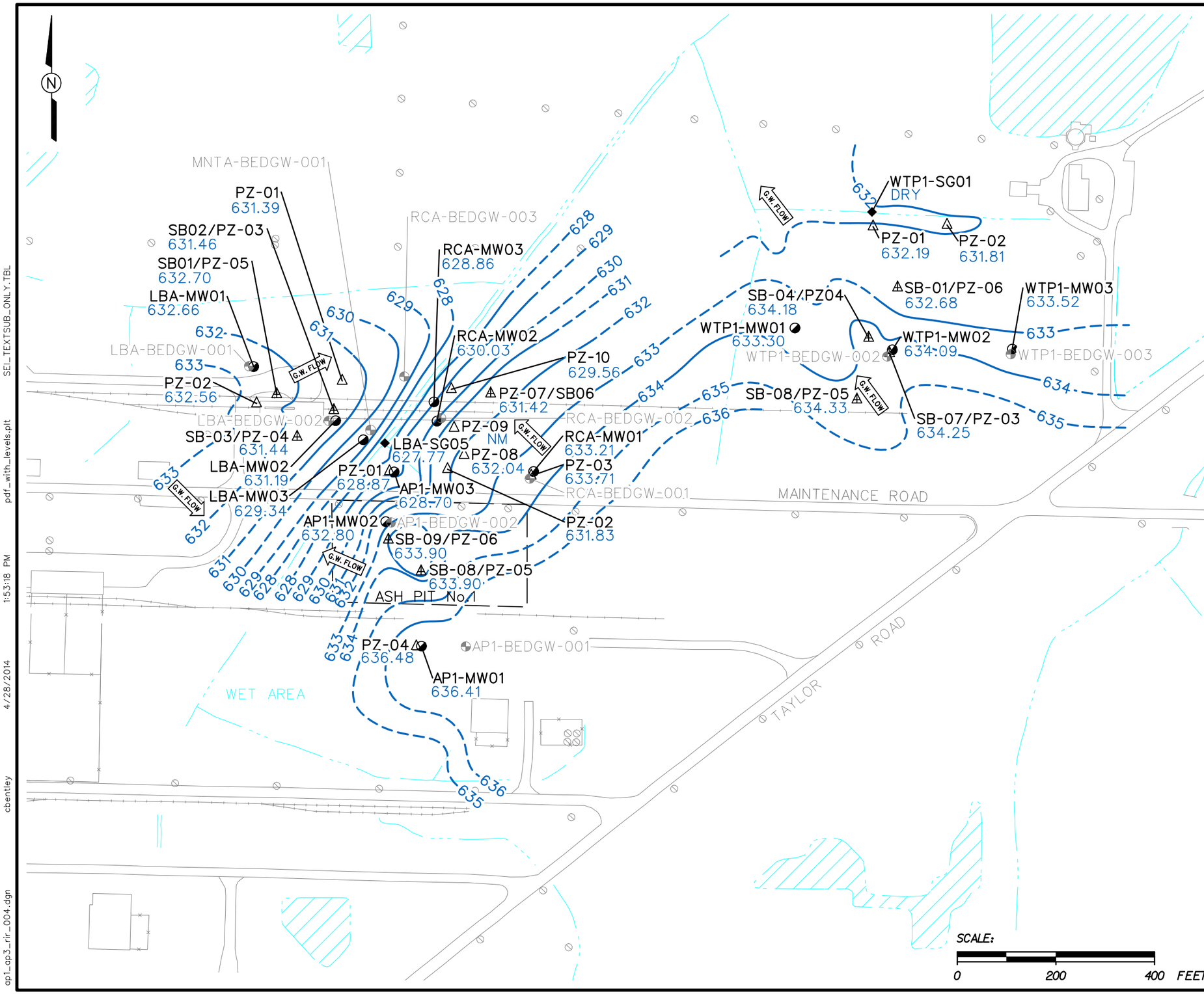

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- PIEZOMETER
- SOIL BORING/PIEZOMETER
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- 628.85 GROUNDWATER ELEVATION (FT. MSL)
- 635 GROUNDWATER ELEVATION CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- NM NOT MEASURED

SCALE:

0 200 400 FEET

FIGURE 3-2

ASH PIT No. 1 OVERBURDEN/ SHALE GROUNDWATER ELEVATION CONTOUR MAP (MAY 26, 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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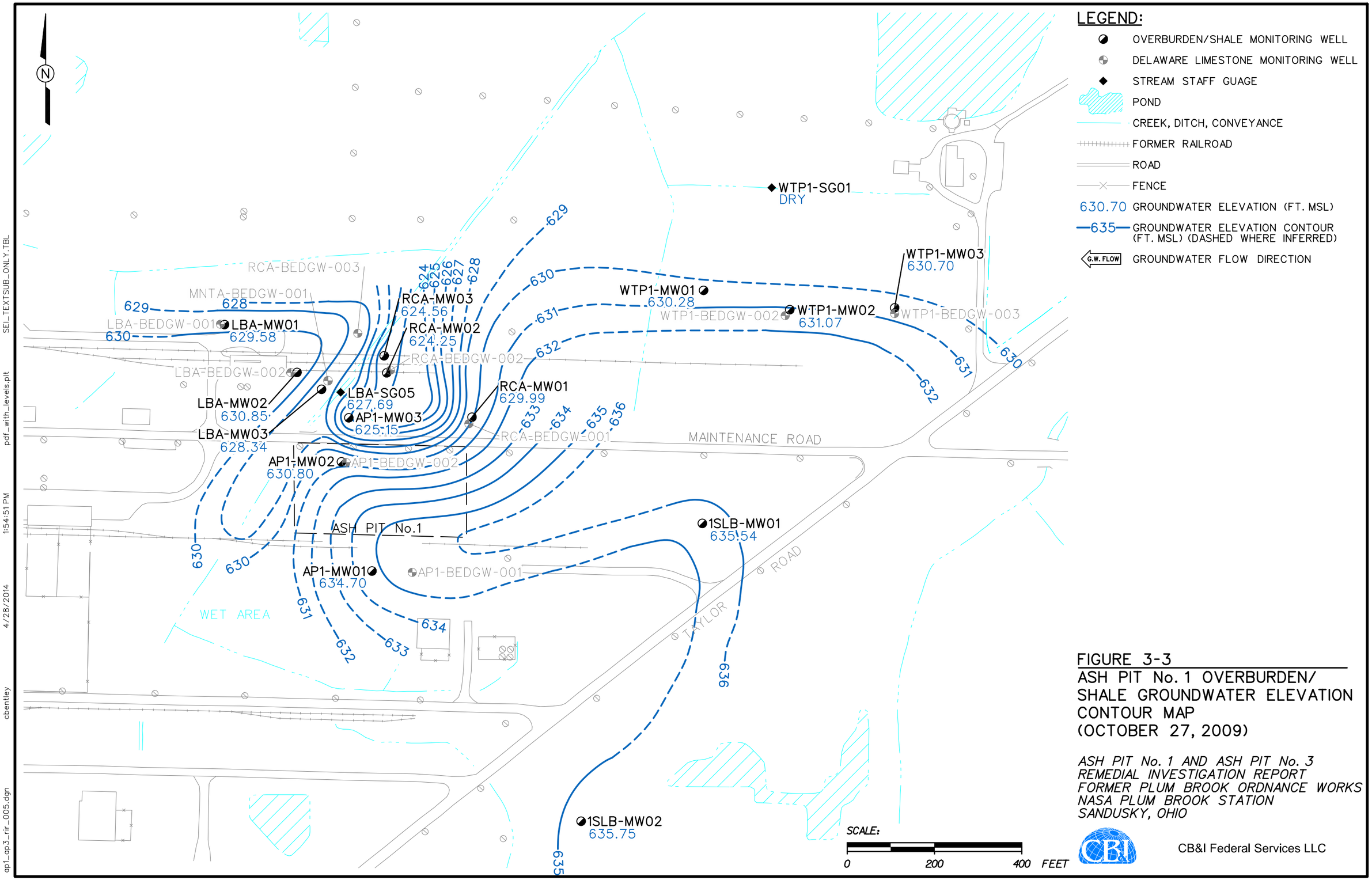
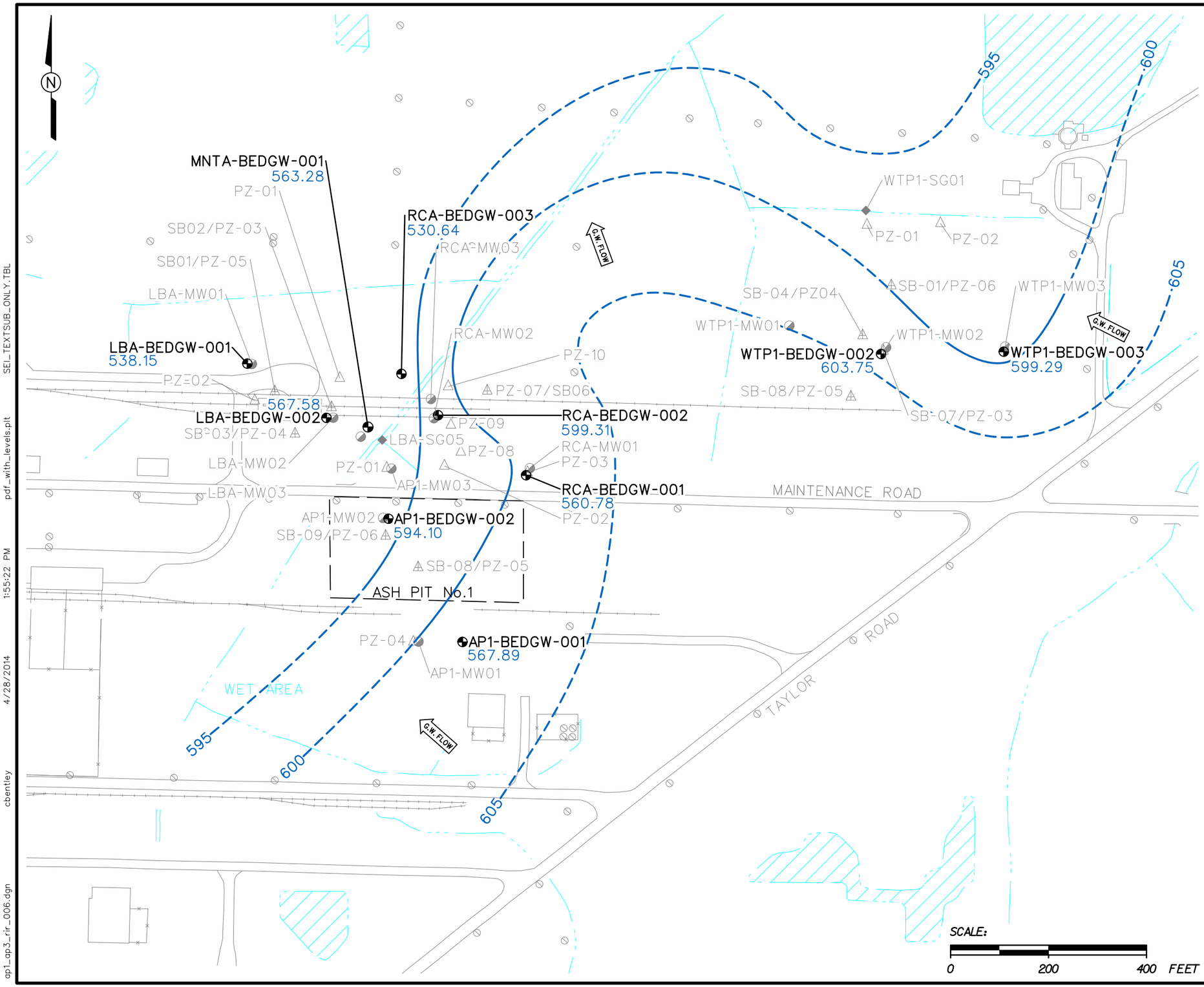


FIGURE 3-3
ASH PIT No. 1 OVERBURDEN/ SHALE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 27, 2009)

ASH PIT No. 1 AND ASH PIT No. 3 REMEDIAL INVESTIGATION REPORT FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO



LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- PIEZOMETER
- SOIL BORING/PIEZOMETER
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- 599.29 GROUNDWATER ELEVATION (FT. MSL)
- 600 GROUNDWATER ELEVATION CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUNDWATER ELEVATIONS OF LBA-BEDGW-001, LBA-BEDGW-002, MNTA-BEDGW-001, RCA-BEDGW-001, AP1-BEDGW-001, AND RCA-BEDGW-003 WERE NOT USED DUE TO ELEVATIONS MUCH LOWER THAN ADJACENT WELLS THEREFORE PRODUCING CONTOURS THAT ARE INCONSISTENT WITH THE GENERAL GROUNDWATER FLOW TREND. VARIATIONS IN ELEVATION MAY BE CAUSED BY LOW-PRODUCING BEDROCK FRACTURES, WELLS SCREENED WITHIN DIFFERENT FRACTURE NETWORKS, OR NON-STATIC WATER LEVELS CAUSED BY RECENT NEARBY CORE DRILLING ACTIVITIES.

SCALE:
0 200 400 FEET

FIGURE 3-4
ASH PIT No. 1 DELAWARE LIMESTONE GROUNDWATER ELEVATION CONTOUR MAP (MAY 26, 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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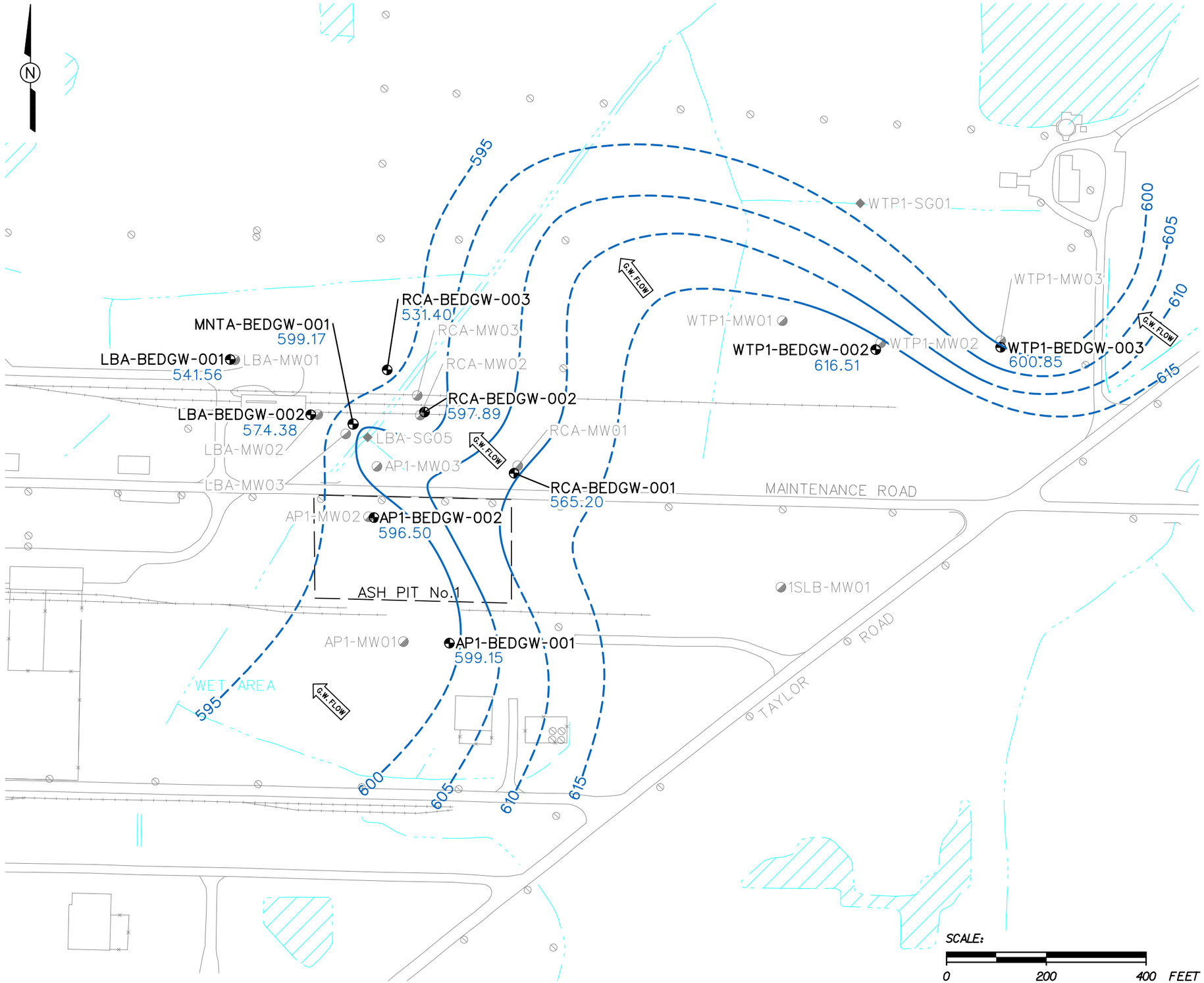

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- 600.85 GROUNDWATER ELEVATION (FT. MSL)
- —600— GROUNDWATER ELEVATION CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUNDWATER ELEVATIONS OF LBA-BEDGW-001, LBA-BEDGW-002, RCA-BEDGW-001, AP1-BEDGW-001, AND RCA-BEDGW-003 WERE NOT USED DUE TO ELEVATIONS MUCH LOWER THAN ADJACENT WELLS THEREFORE PRODUCING CONTOURS THAT ARE INCONSISTENT WITH THE GENERAL GROUNDWATER FLOW TREND. VARIATIONS IN ELEVATION MAY BE CAUSED BY LOW-PRODUCING BEDROCK FRACTURES OR WELLS SCREENED WITHIN DIFFERENT FRACTURE NETWORKS.

SCALE:
0 200 400 FEET

FIGURE 3-5
ASH PIT No. 1 DELAWARE LIMESTONE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 27, 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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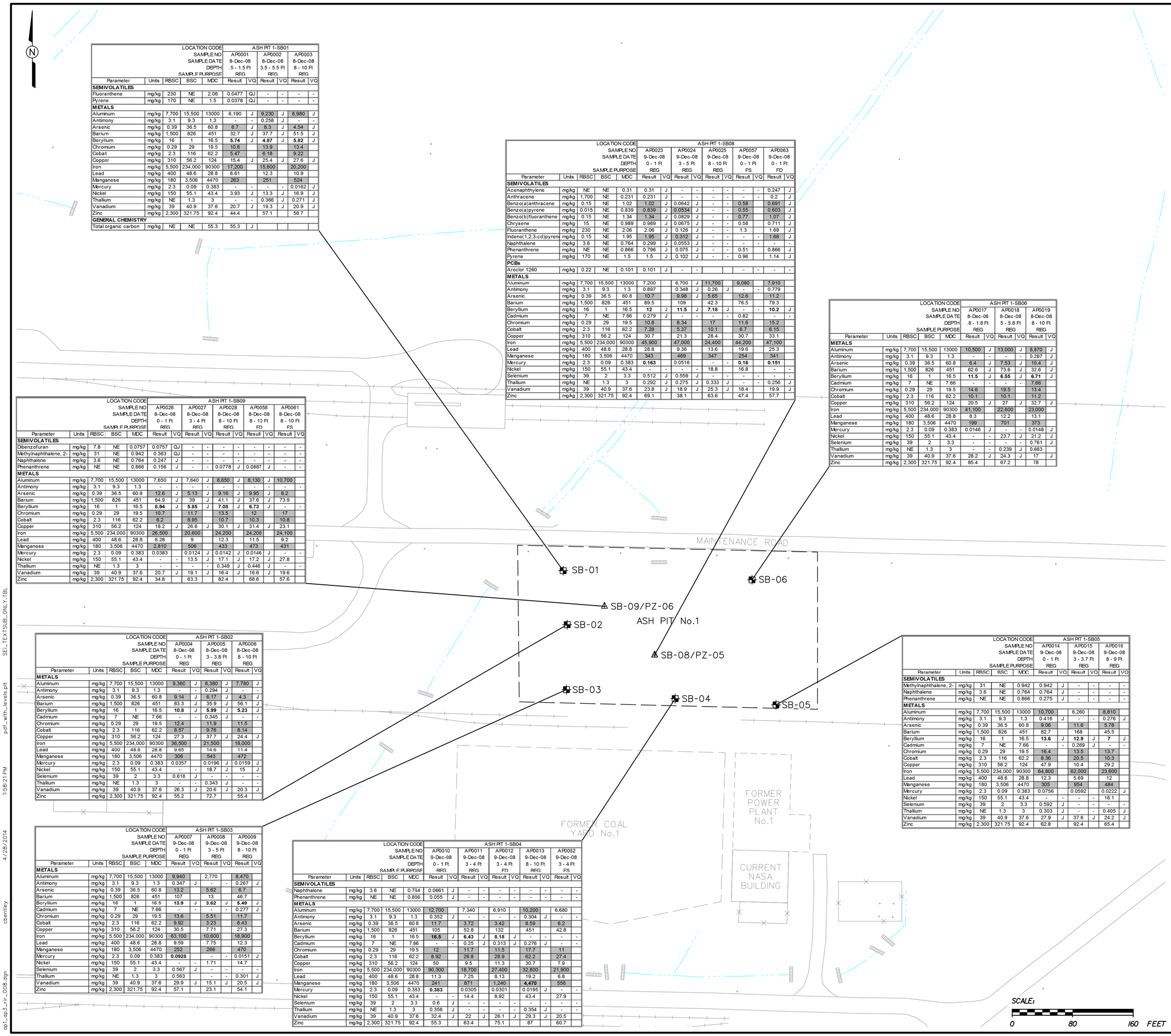

				LOCATION CODE	ASH PIT 1-SB01					
				SAMPLE NO	AP0001		AP0002		AP0003	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08	
				DEPTH	.5 - 1.5 Ft		3.5 - 5.5 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Fluoranthene	mg/kg	230	NE	2.06	0.0477	QJ	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	0.0378	QJ	-	-	-	-
METALS										
Aluminum	mg/kg	7,700	15,500	13000	6,190	J	9,230	J	8,980	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.258	J	-	-
Arsenic	mg/kg	0.39	36.5	60.8	6.7	J	8.3	J	4.54	J
Barium	mg/kg	1,500	826	451	32.7	J	37.7	J	51.5	J
Beryllium	mg/kg	16	1	16.5	**5.74**	J	**4.87**	J	**5.82**	J
Chromium	mg/kg	0.29	29	19.5	10.6		13.9		13.4	
Cobalt	mg/kg	2.3	116	62.2	5.47		6.18		9.22	
Copper	mg/kg	310	56.2	124	15.4	J	25.4	J	27.6	J
Iron	mg/kg	5,500	234,000	90300	17,200		15,600		20,200	
Lead	mg/kg	400	48.6	28.8	6.61		12.3		10.9	
Manganese	mg/kg	180	3,506	4470	263		251		524	
Mercury	mg/kg	2.3	0.09	0.383	-	-	-	-	0.0162	J
Nickel	mg/kg	150	55.1	43.4	3.93	J	13.3	J	16.9	J
Thallium	mg/kg	NE	1.3	3	-	-	0.366	J	0.271	J
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.3	J	20.9	J
Zinc	mg/kg	2,300	321.75	92.4	44.4		57.1		58.7	
GENERAL CHEMISTRY										
Total organic carbon	mg/kg	NE	NE	55.3	55.3	J				

				LOCATION CODE	ASH PIT 1-SB08									
				SAMPLE NO	AP0023		AP0024		AP0025		AP0057		AP0063	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FS		FD	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Acenaphthylene	mg/kg	NE	NE	0.31	0.31	J	-	-	-	-	-	-	0.247	J
Anthracene	mg/kg	1,700	NE	0.231	0.231	J	-	-	-	-	-	-	0.2	J
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	1.02	J	0.0642	J	-	-	0.58		0.691	J
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	0.839	J	0.0534	J	-	-	0.55		0.603	J
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	1.34	J	0.0829	J	-	-	0.77		1.07	J
Chrysene	mg/kg	15	NE	0.989	0.989	J	0.0675	J	-	-	0.58		0.711	J
Fluoranthene	mg/kg	230	NE	2.06	2.06	J	0.126	J	-	-	1.3		1.69	J
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	1.95	J	0.312	J	-	-	-	-	1.68	J
Naphthalene	mg/kg	3.6	NE	0.764	0.299	J	0.0553	J	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.796	J	0.075	J	-	-	0.51		0.866	J
Pyrene	mg/kg	170	NE	1.5	1.5	J	0.102	J	-	-	0.96		1.14	J
PCBs														
Aroclor 1260	mg/kg	0.22	NE	0.101	0.101	J	-	-			-	-	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	7,200		6,700	J	11,700		9,080		7,910	
Antimony	mg/kg	3.1	9.3	1.3	0.897		0.348	J	0.26	J	-	-	0.779	
Arsenic	mg/kg	0.39	36.5	60.8	10.7		9.98	J	5.65		12.6		11.2	
Barium	mg/kg	1,500	826	451	89.5		109		42.3		76.5		79.3	
Beryllium	mg/kg	16	1	16.5	**12**	J	**11.5**	J	**7.18**	J	-	-	**10.2**	J
Cadmium	mg/kg	7	NE	7.66	0.279	J	-	-	-	-	0.82		-	-
Chromium	mg/kg	0.29	29	19.5	10.8		8.34		17		11.6		15.2	
Cobalt	mg/kg	2.3	116	62.2	7.28		5.37		10.1		6.7		6.15	
Copper	mg/kg	310	56.2	124	30.7		21.3		28.4		30.7		33.1	
Iron	mg/kg	5,500	234,000	90300	45,900		47,000		24,400		44,200		47,100	
Lead	mg/kg	400	48.6	28.8	28.8		9.36		13.6		19.6		25.3	
Manganese	mg/kg	180	3,506	4470	343		469		347		254		341	
Mercury	mg/kg	2.3	0.09	0.383	**0.163**		0.0516		-	-	**0.16**		**0.151**	
Nickel	mg/kg	150	55.1	43.4	-	-	-	-	18.8		16.8		-	-
Selenium	mg/kg	39	2	3.3	0.512	J	0.559	J	-	-	-	-	-	-
Thallium	mg/kg	NE	1.3	3	0.292	J	0.275	J	0.333	J	-	-	0.256	J
Vanadium	mg/kg	39	40.9	37.6	23.8	J	18.9	J	25.3	J	18.4		19.9	J
Zinc	mg/kg	2,300	321.75	92.4	69.1		38.1		63.6		47.4		57.7	

				LOCATION CODE	ASH PIT 1-SB06					
				SAMPLE NO	AP0017		AP0018		AP0019	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08	
				DEPTH	.8 - 1.8 Ft		5 - 5.8 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	7,700	15,500	13000	10,500	J	13,000	J	8,870	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	0.287	J
Arsenic	mg/kg	0.39	36.5	60.8	6.4	J	7.53	J	10.4	J
Barium	mg/kg	1,500	826	451	62.6	J	73.6	J	32.6	J
Beryllium	mg/kg	16	1	16.5	**11.5**	J	**6.55**	J	**6.71**	J
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	7.66	
Chromium	mg/kg	0.29	29	19.5	14.6		19.5		13.4	
Cobalt	mg/kg	2.3	116	62.2	10.1		10.1		11.2	
Copper	mg/kg	310	56.2	124	20.5	J	27	J	32.7	J
Iron	mg/kg	5,500	234,000	90300	41,100		22,600		23,000	
Lead	mg/kg	400	48.6	28.8	8.3		12.2		13.1	
Manganese	mg/kg	180	3,506	4470	199		701		373	
Mercury	mg/kg	2.3	0.09	0.383	0.0146	J	-	-	0.0148	J
Nickel	mg/kg	150	55.1	43.4	-	-	23.7	J	21.2	J
Selenium	mg/kg	39	2	3.3	-	-	-	-	0.761	J
Thallium	mg/kg	NE	1.3	3	-	-	0.239	J	0.663	
Vanadium	mg/kg	39	40.9	37.6	28.2	J	24.3	J	17	J
Zinc	mg/kg	2,300	321.75	92.4	85.4		67.2		78	

				LOCATION CODE	ASH PIT 1-SB09									
				SAMPLE NO	AP0026		AP0027		AP0028		AP0058		AP0061	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08	
				DEPTH	0 - 1 Ft		3 - 4 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Dibenzofuran	mg/kg	7.8	NE	0.0757	0.0757	QJ	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.363	QJ	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.247	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.156	J	-	-	0.0778	J	0.0887	J	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	7,650	J	7,640	J	8,650	J	8,130	J	10,700	
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	12.6	J	5.13	J	9.16	J	9.95	J	8.2	
Barium	mg/kg	1,500	826	451	84.9	J	39	J	41.1	J	37.6	J	73.9	
Beryllium	mg/kg	16	1	16.5	**8.94**	J	**5.85**	J	**7.08**	J	**6.73**	J	-	-
Chromium	mg/kg	0.29	29	19.5	10.7		11.7		13.5		12		17	
Cobalt	mg/kg	2.3	116	62.2	6.2		8.95		10.7		10.3		10.8	
Copper	mg/kg	310	56.2	124	18.2	J	26.6	J	30.1	J	31.4	J	23.1	
Iron	mg/kg	5,500	234,000	90300	26,500		20,600		24,200		24,200		24,100	
Lead	mg/kg	400	48.6	28.8	6.28		9		12.3		11.5		9.2	
Manganese	mg/kg	180	3,506	4470	2,810		506		433		473		431	
Mercury	mg/kg	2.3	0.09	0.383	0.0383		0.0124	J	0.0142	J	0.0146	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	13.5	J	17.1	J	17.2	J	27.8	
Thallium	mg/kg	NE	1.3	3	-	-	-	-	0.349	J	0.446	J	-	-
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.1	J	16.4	J	16.6	J	19.6	
Zinc	mg/kg	2,300	321.75	92.4	34.8		63.3		82.4		68.6		57.6	

				LOCATION CODE	ASH PIT 1-SB05					
				SAMPLE NO	AP0014		AP0015		AP0016	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	0 - 1 Ft		3 - 3.7 Ft		8 - 9 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.942	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.764	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.275	J	-	-	-	-
METALS										
Aluminum	mg/kg	7,700	15,500	13000	10,700		6,260		8,810	
Antimony	mg/kg	3.1	9.3	1.3	0.416	J	-	-	0.276	J
Arsenic	mg/kg	0.39	36.5	60.8	9.06		11.6		5.78	
Barium	mg/kg	1,500	826	451	82.7		168		45.5	
Beryllium	mg/kg	16	1	16.5	**13.6**	J	**12.9**	J	**7**	J
Cadmium	mg/kg	7	NE	7.66	-	-	0.269	J	-	-
Chromium	mg/kg	0.29	29	19.5	16.4		13.5		13.7	
Cobalt	mg/kg	2.3	116	62.2	8.36		20.5		10.3	
Copper	mg/kg	310	56.2	124	47.9		10.4		29.2	
Iron	mg/kg	5,500	234,000	90300	64,800		62,000		23,600	
Lead	mg/kg	400	48.6	28.8	12.3		5.69		12	
Manganese	mg/kg	180	3,506	4470	305		954		484	
Mercury	mg/kg	2.3	0.09	0.383	0.0756		0.0592		0.0222	J
Nickel	mg/kg	150	55.1	43.4	-	-	-	-	16.1	
Selenium	mg/kg	39	2	3.3	0.592	J	-	-	-	-
Thallium	mg/kg	NE	1.3	3	0.303	J	-	-	0.405	J
Vanadium	mg/kg	39	40.9	37.6	27.9	J	37.6	J	24.2	J
Zinc	mg/kg	2,300	321.75	92.4	62.8		92.4		65.4	

				LOCATION CODE	ASH PIT 1-SB02					
				SAMPLE NO	AP0004		AP0005		AP0006	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08	
				DEPTH	0 - 1 Ft		3 - 3.8 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	7,700	15,500	13000	9,360	J	8,380	J	7,780	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.294	J	-	-
Arsenic	mg/kg	0.39	36.5	60.8	9.14	J	6.17	J	4.3	J
Barium	mg/kg	1,500	826	451	83.3	J	35.9	J	56.1	J
Beryllium	mg/kg	16	1	16.5	**10.8**	J	**5.99**	J	**5.23**	J
Cadmium	mg/kg	7	NE	7.66	-		0.345	J	-	-
Chromium	mg/kg	0.29	29	19.5	12.4		11.9		11.5	
Cobalt	mg/kg	2.3	116	62.2	8.57		9.76		8.14	
Copper	mg/kg	310	56.2	124	27.3	J	37.7	J	24.4	J
Iron	mg/kg	5,500	234,000	90300	36,500		21,500		18,000	
Lead	mg/kg	400	48.6	28.8	9.65		14.6		11.4	
Manganese	mg/kg	180	3,506	4470	306		543		472	
Mercury	mg/kg	2.3	0.09	0.383	0.0357		0.0196	J	0.0159	J
Nickel	mg/kg	150	55.1	43.4	-	-	18.7	J	15	J
Selenium	mg/kg	39	2	3.3	0.618	J	-	-	-	-
Thallium	mg/kg	NE	1.3	3	-	-	0.343	J	-	-
Vanadium	mg/kg	39	40.9	37.6	26.3	J	20.6	J	20.3	J
Zinc	mg/kg	2,300	321.75	92.4	55.2		72.7		55.4	

				LOCATION CODE	ASH PIT 1-SB03					
				SAMPLE NO	AP0007		AP0008		AP0009	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	7,700	15,500	13000	9,940		2,770		8,470	
Antimony	mg/kg	3.1	9.3	1.3	0.347	J	-	-	0.267	J
Arsenic	mg/kg	0.39	36.5	60.8	13.2		5.62		6.7	
Barium	mg/kg	1,500	826	451	107		13		46.7	
Beryllium	mg/kg	16	1	16.5	**13.9**	J	**3.62**	J	**5.49**	J
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	0.277	J
Chromium	mg/kg	0.29	29	19.5	13.6		5.51		11.7	
Cobalt	mg/kg	2.3	116	62.2	9.92		3.23		8.43	
Copper	mg/kg	310	56.2	124	30.5		7.71		27.3	
Iron	mg/kg	5,500	234,000	90300	63,100		10,600		18,900	
Lead	mg/kg	400	48.6	28.8	9.59		7.75		12.3	
Manganese	mg/kg	180	3,506	4470	252		266		470	
Mercury	mg/kg	2.3	0.09	0.383	**0.0928**		-	-	0.0151	J
Nickel	mg/kg	150	55.1	43.4	-	-	1.71		14.7	
Selenium	mg/kg	39	2	3.3	0.567	J	-	-	-	-
Thallium	mg/kg	NE	1.3	3	0.563		-	-	0.301	J
Vanadium	mg/kg	39	40.9	37.6	29.9	J	15.1	J	20.5	J
Zinc	mg/kg	2,300	321.75	92.4	57.1		23.1		54.1	

				LOCATION CODE	ASH PIT 1-SB04									
				SAMPLE NO	AP0010		AP0011		AP0012		AP0013		AP0052	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	0 - 1 Ft		3 - 4 Ft		3 - 4 Ft		8 - 10 Ft		3 - 4 Ft	
				SAMPLE PURPOSE	REG		REG		FD		REG		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Naphthalene	mg/kg	3.6	NE	0.764	0.0661	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.055	J	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	12,700		7,340		6,910		10,200		6,680	
Antimony	mg/kg	3.1	9.3	1.3	0.352	J	-	-	-	-	0.304	J	-	-
Arsenic	mg/kg	0.39	36.5	60.8	11.7		3.72		3.42		8.59		6.2	
Barium	mg/kg	1,500	826	451	105		52.8		132		451		42.8	
Beryllium	mg/kg	16	1	16.5	**16.5**	J	**6.43**	J	**8.18**	J	-	-	-	-
Cadmium	mg/kg	7	NE	7.66	-	-	0.25	J	0.313	J	0.276	J	-	-
Chromium	mg/kg	0.29	29	19.5	12		11.7		11.5		17.7		11	
Cobalt	mg/kg	2.3	116	62.2	8.92		26.8		28.9		62.2		27.4	
Copper	mg/kg	310	56.2	124	50		9.5		11.3		30.7		7.9	
Iron	mg/kg	5,500	234,000	90300	90,300		18,700		27,400		32,800		21,900	
Lead	mg/kg	400	48.6	28.8	11.3		7.25		8.13		19.2		6.8	
Manganese	mg/kg	180	3,506	4470	241		871		1,240		**4,470**		556	
Mercury	mg/kg	2.3	0.09	0.383	**0.383**		0.0305		0.0301		0.0195	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	14.4		8.92		43.4		27.9	
Selenium	mg/kg	39	2	3.3	0.6	J	-	-	-	-	-	-	-	-
Thallium	mg/kg	NE	1.3	3	0.356	J	-	-	-	-	0.354	J	-	-
Vanadium	mg/kg	39	40.9	37.6	32.4	J	22	J	26.1	J	29.3	J	20.5	
Zinc	mg/kg	2,300	321.75	92.4	55.3		63.4		75.1		87		60.7	

LEGEND:

- SOIL BORING
- SOIL BORING/PIEZOMETER
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - Q- RESULT CALCULATED FROM LINEAR REGRESSION. THE INSTRUMENT RESPONSE IS LESS THAN 20% OF THE INSTRUMENT RESPONSE OF THE LOW STANDARD OF THE CALIBRATION CURVE. PER THE ANALYTICAL METHOD, AN INSTRUMENT RESPONSE BELOW 20% OF THE LOW STANDARD FOR ANY PARTICULAR COMPOUND SHOULD BE REPORTED BY THE LAB AS NON-DETECT.

SCALE:

0 80 160 FEET

FIGURE 3-6
DETECTED CONSTITUENTS AT ASH PIT No. 1 IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2008)

ASH PIT No. 1 AND ASH PIT No. 3 REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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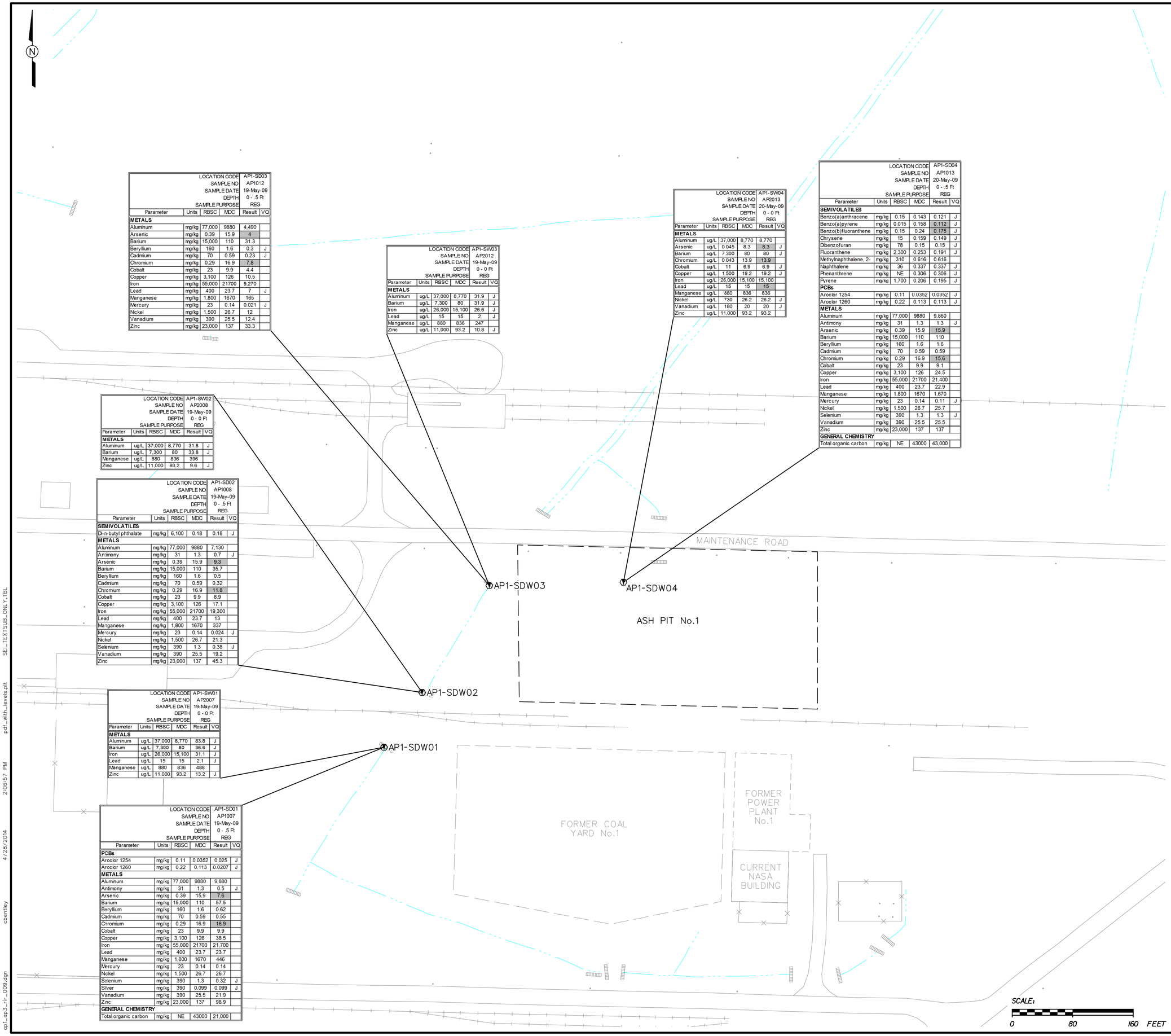

	LOCATION CODE	AP1-SD03			
	SAMPLE NO	AP1012			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - .5 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	mg/kg	77,000	9880	4,490	
Arsenic	mg/kg	0.39	15.9	4	
Barium	mg/kg	15,000	110	31.3	
Beryllium	mg/kg	160	1.6	0.3	J
Cadmium	mg/kg	70	0.59	0.23	J
Chromium	mg/kg	0.29	16.9	7.8	
Cobalt	mg/kg	23	9.9	4.4	
Copper	mg/kg	3,100	126	10.5	
Iron	mg/kg	55,000	21700	9,270	
Lead	mg/kg	400	23.7	7	J
Manganese	mg/kg	1,800	1670	165	
Mercury	mg/kg	23	0.14	0.021	J
Nickel	mg/kg	1,500	26.7	12	
Vanadium	mg/kg	390	25.5	12.4	
Zinc	mg/kg	23,000	137	33.3	

	LOCATION CODE	AP1-SW03			
	SAMPLE NO	AP2012			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - 0 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	31.9	J
Barium	ug/L	7,300	80	31.9	J
Iron	ug/L	26,000	15,100	26.6	J
Lead	ug/L	15	15	2	J
Manganese	ug/L	880	836	247	
Zinc	ug/L	11,000	93.2	10.8	J

	LOCATION CODE	AP1-SW04			
	SAMPLE NO	AP2013			
	SAMPLE DATE	20-May-09			
	DEPTH	0 - 0 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	8,770	
Arsenic	ug/L	0.045	8.3	8.3	J
Barium	ug/L	7,300	80	80	J
Chromium	ug/L	0.043	13.9	13.9	
Cobalt	ug/L	11	6.9	6.9	J
Copper	ug/L	1,500	19.2	19.2	J
Iron	ug/L	26,000	15,100	15,100	
Lead	ug/L	15	15	15	
Manganese	ug/L	880	836	836	
Nickel	ug/L	730	26.2	26.2	J
Vanadium	ug/L	180	20	20	J
Zinc	ug/L	11,000	93.2	93.2	

	LOCATION CODE	AP1-SD04			
	SAMPLE NO	AP1013			
	SAMPLE DATE	20-May-09			
	DEPTH	0 - .5 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Benzo(a)anthracene	mg/kg	0.15	0.143	0.121	J
Benzo(a)pyrene	mg/kg	0.015	0.158	0.112	J
Benzo(b)fluoranthene	mg/kg	0.15	0.24	0.175	J
Chrysene	mg/kg	15	0.159	0.149	J
Dibenzofuran	mg/kg	78	0.15	0.15	J
Fluoranthene	mg/kg	2,300	0.253	0.191	J
Methylnaphthalene, 2-	mg/kg	310	0.616	0.616	
Naphthalene	mg/kg	36	0.337	0.337	J
Phenanthrene	mg/kg	NE	0.306	0.306	J
Pyrene	mg/kg	1,700	0.206	0.195	J
PCBs					
Aroclor 1254	mg/kg	0.11	0.0352	0.0352	J
Aroclor 1260	mg/kg	0.22	0.113	0.113	J
METALS					
Aluminum	mg/kg	77,000	9880	9,860	
Antimony	mg/kg	31	1.3	1.3	J
Arsenic	mg/kg	0.39	15.9	15.9	
Barium	mg/kg	15,000	110	110	
Beryllium	mg/kg	160	1.6	1.6	
Cadmium	mg/kg	70	0.59	0.59	
Chromium	mg/kg	0.29	16.9	15.6	
Cobalt	mg/kg	23	9.9	9.1	
Copper	mg/kg	3,100	126	24.5	
Iron	mg/kg	55,000	21700	21,400	
Lead	mg/kg	400	23.7	22.9	
Manganese	mg/kg	1,800	1670	1,670	
Mercury	mg/kg	23	0.14	0.11	J
Nickel	mg/kg	1,500	26.7	25.7	
Selenium	mg/kg	390	1.3	1.3	J
Vanadium	mg/kg	390	25.5	25.5	
Zinc	mg/kg	23,000	137	137	
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	43,000	

	LOCATION CODE	AP1-SW02			
	SAMPLE NO	AP2008			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - 0 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	31.8	J
Barium	ug/L	7,300	80	33.8	J
Manganese	ug/L	880	836	396	
Zinc	ug/L	11,000	93.2	9.6	J

	LOCATION CODE	AP1-SD02			
	SAMPLE NO	AP1008			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - .5 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Di-n-butyl phthalate	mg/kg	6,100	0.18	0.18	J
METALS					
Aluminum	mg/kg	77,000	9880	7,130	
Antimony	mg/kg	31	1.3	0.7	J
Arsenic	mg/kg	0.39	15.9	9.3	
Barium	mg/kg	15,000	110	35.7	
Beryllium	mg/kg	160	1.6	0.5	
Cadmium	mg/kg	70	0.59	0.32	
Chromium	mg/kg	0.29	16.9	11.8	
Cobalt	mg/kg	23	9.9	8.9	
Copper	mg/kg	3,100	126	17.1	
Iron	mg/kg	55,000	21700	19,300	
Lead	mg/kg	400	23.7	13	
Manganese	mg/kg	1,800	1670	337	
Mercury	mg/kg	23	0.14	0.024	J
Nickel	mg/kg	1,500	26.7	21.3	
Selenium	mg/kg	390	1.3	0.38	J
Vanadium	mg/kg	390	25.5	19.2	
Zinc	mg/kg	23,000	137	45.3	

	LOCATION CODE	AP1-SW01			
	SAMPLE NO	AP2007			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - 0 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	83.8	J
Barium	ug/L	7,300	80	36.6	J
Iron	ug/L	26,000	15,100	31.1	J
Lead	ug/L	15	15	2.1	J
Manganese	ug/L	880	836	488	
Zinc	ug/L	11,000	93.2	13.2	J

	LOCATION CODE	AP1-SD01			
	SAMPLE NO	AP1007			
	SAMPLE DATE	19-May-09			
	DEPTH	0 - .5 Ft			
	SAMPLE PURPOSE	REG			
Parameter	Units	RBSC	MDC	Result	VQ
PCBs					
Aroclor 1254	mg/kg	0.11	0.0352	0.025	J
Aroclor 1260	mg/kg	0.22	0.113	0.0207	J
METALS					
Aluminum	mg/kg	77,000	9880	9,880	
Antimony	mg/kg	31	1.3	0.5	J
Arsenic	mg/kg	0.39	15.9	7.6	
Barium	mg/kg	15,000	110	57.5	
Beryllium	mg/kg	160	1.6	0.62	
Cadmium	mg/kg	70	0.59	0.55	
Chromium	mg/kg	0.29	16.9	16.9	
Cobalt	mg/kg	23	9.9	9.9	
Copper	mg/kg	3,100	126	38.5	
Iron	mg/kg	55,000	21700	21,700	
Lead	mg/kg	400	23.7	23.7	
Manganese	mg/kg	1,800	1670	446	
Mercury	mg/kg	23	0.14	0.14	
Nickel	mg/kg	1,500	26.7	26.7	
Selenium	mg/kg	390	1.3	0.32	J
Silver	mg/kg	390	0.099	0.099	J
Vanadium	mg/kg	390	25.5	21.9	
Zinc	mg/kg	23,000	137	98.9	
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	21,000	

LEGEND:

- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- ug/L MIROGRAM PER LITER
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES ARE BASED ON REGIONAL SCREENING LEVELS DESCRIBED IN THE TEXT.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, CHLORIDE, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
5. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.

FIGURE 3-7
DETECTED CONSTITUENTS AT ASH PIT No. 1 IN SURFACE WATER AND SEDIMENT SAMPLES ABOVE RBSCs (MAY 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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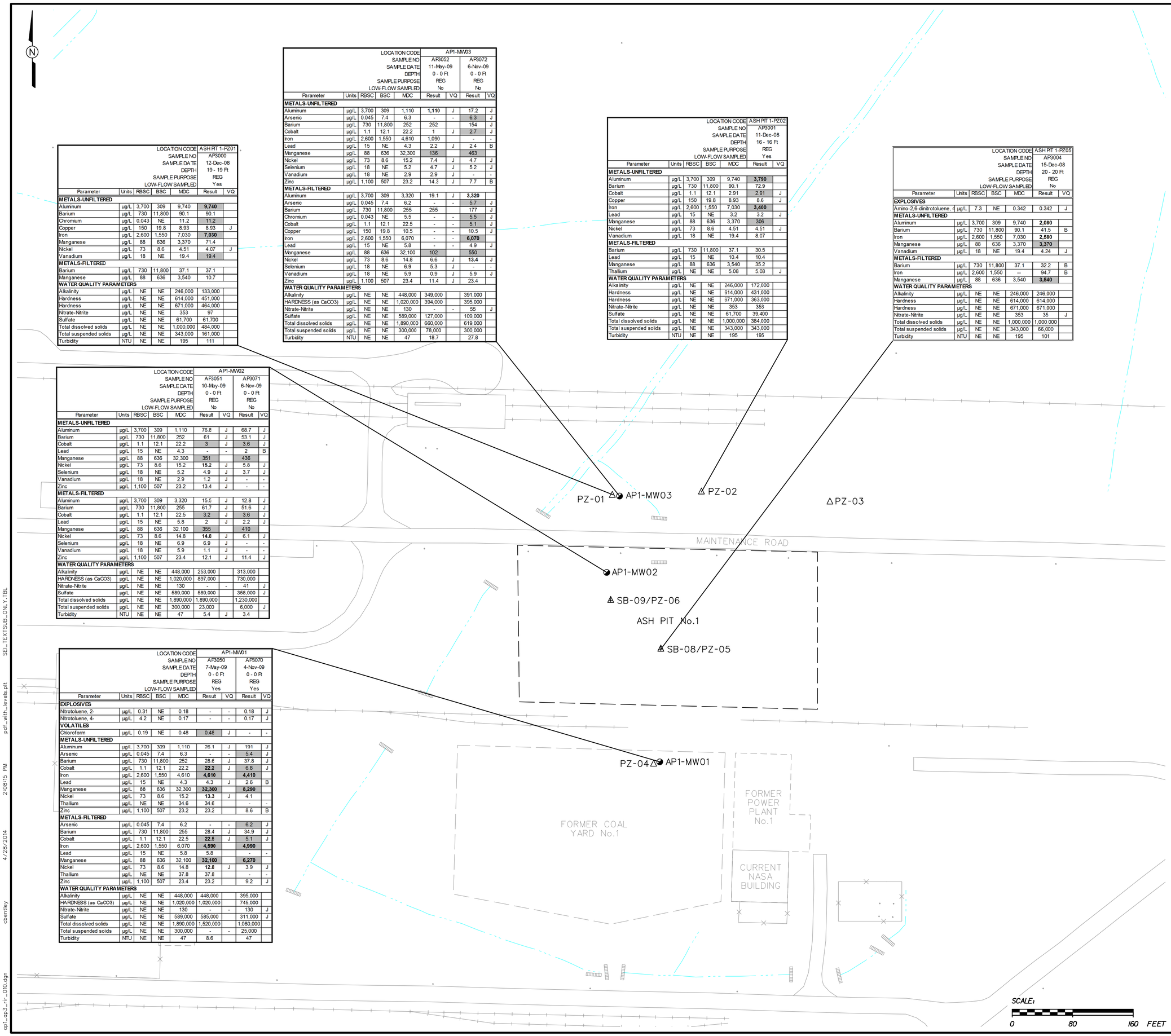

				LOCATION CODE	ASH PIT 1-PZ01	
				SAMPLE NO	AP3000	
				SAMPLE DATE	12-Dec-08	
				DEPTH	19 - 19 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**9,740**	
Barium	µg/L	730	11,800	90.1	90.1	
Chromium	µg/L	0.043	NE	11.2	11.2	
Copper	µg/L	150	19.8	8.93	8.93	J
Iron	µg/L	2,600	1,550	7,030	**7,030**	
Manganese	µg/L	88	636	3,370	71.4	
Nickel	µg/L	73	8.6	4.51	4.07	J
Vanadium	µg/L	18	NE	19.4	19.4	
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	37.1	
Manganese	µg/L	88	636	3,540	10.7	
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	133,000	
Hardness	µg/L	NE	NE	614,000	451,000	
Hardness	µg/L	NE	NE	671,000	464,000	
Nitrate-Nitrite	µg/L	NE	NE	353	97	
Sulfate	µg/L	NE	NE	61,700	61,700	
Total dissolved solids	µg/L	NE	NE	1,000,000	484,000	
Total suspended solids	µg/L	NE	NE	343,000	161,000	
Turbidity	NTU	NE	NE	195	111	

				LOCATION CODE	AP1-MW03			
				SAMPLE NO	AP3052		AP3072	
				SAMPLE DATE	11-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	**1,110**	J	17.2	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	6.3	J
Barium	µg/L	730	11,800	252	252		154	J
Cobalt	µg/L	1.1	12.1	22.2	1	J	2.7	J
Iron	µg/L	2,600	1,550	4,610	1,090		-	-
Lead	µg/L	15	NE	4.3	2.2	J	2.4	B
Manganese	µg/L	88	636	32,300	136		463	
Nickel	µg/L	73	8.6	15.2	7.4	J	4.7	J
Selenium	µg/L	18	NE	5.2	4.7	J	5.2	J
Vanadium	µg/L	18	NE	2.9	2.9	J	-	-
Zinc	µg/L	1,100	507	23.2	14.3	J	7.7	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	3,320	19.1	J	**3,320**	
Arsenic	µg/L	0.045	7.4	6.2	-	-	5.7	J
Barium	µg/L	730	11,800	255	255		177	J
Chromium	µg/L	0.043	NE	5.5	-	-	5.5	J
Cobalt	µg/L	1.1	12.1	22.5	-	-	5.1	J
Copper	µg/L	150	19.8	10.5	-	-	10.5	J
Iron	µg/L	2,600	1,550	6,070	-	-	**6,070**	
Lead	µg/L	15	NE	5.8	-	-	4.9	J
Manganese	µg/L	88	636	32,100	102		550	
Nickel	µg/L	73	8.6	14.8	6.6	J	**13.4**	J
Selenium	µg/L	18	NE	6.9	5.3	J	-	-
Vanadium	µg/L	18	NE	5.9	0.9	J	5.9	J
Zinc	µg/L	1,100	507	23.4	11.4	J	23.4	
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	349,000		391,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	394,000		395,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	55	J
Sulfate	µg/L	NE	NE	589,000	127,000		109,000	
Total dissolved solids	µg/L	NE	NE	1,890,000	660,000		619,000	
Total suspended solids	µg/L	NE	NE	300,000	78,000		300,000	
Turbidity	NTU	NE	NE	47	18.7		27.8	

				LOCATION CODE	ASH PIT 1-PZ02	
				SAMPLE NO	AP3001	
				SAMPLE DATE	11-Dec-08	
				DEPTH	16 - 16 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**3,790**	
Barium	µg/L	730	11,800	90.1	72.9	
Cobalt	µg/L	1.1	12.1	2.91	2.91	J
Copper	µg/L	150	19.8	8.93	8.6	J
Iron	µg/L	2,600	1,550	7,030	**3,400**	
Lead	µg/L	15	NE	3.2	3.2	J
Manganese	µg/L	88	636	3,370	306	
Nickel	µg/L	73	8.6	4.51	4.51	J
Vanadium	µg/L	18	NE	19.4	8.07	
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	30.5	
Lead	µg/L	15	NE	10.4	10.4	
Manganese	µg/L	88	636	3,540	35.2	
Thallium	µg/L	NE	NE	5.08	5.08	J
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	172,000	
Hardness	µg/L	NE	NE	514,000	431,000	
Hardness	µg/L	NE	NE	571,000	363,000	
Nitrate-Nitrite	µg/L	NE	NE	353	353	
Sulfate	µg/L	NE	NE	61,700	39,400	
Total dissolved solids	µg/L	NE	NE	1,000,000	384,000	
Total suspended solids	µg/L	NE	NE	343,000	343,000	
Turbidity	NTU	NE	NE	195	195	

				LOCATION CODE	ASH PIT 1-PZ05	
				SAMPLE NO	AP3004	
				SAMPLE DATE	15-Dec-08	
				DEPTH	20 - 20 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
EXPLOSIVES						
Amino-2,6-dinitrotoluene, 4	µg/L	7.3	NE	0.342	0.342	J
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**2,080**	
Barium	µg/L	730	11,800	90.1	41.5	B
Iron	µg/L	2,600	1,550	7,030	**2,580**	
Manganese	µg/L	88	636	3,370	**3,370**	
Vanadium	µg/L	18	NE	19.4	4.24	J
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	32.2	B
Iron	µg/L	2,600	1,550	--	94.7	B
Manganese	µg/L	88	636	3,540	**3,540**	
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	246,000	
Hardness	µg/L	NE	NE	614,000	614,000	
Hardness	µg/L	NE	NE	671,000	671,000	
Nitrate-Nitrite	µg/L	NE	NE	353	35	J
Total dissolved solids	µg/L	NE	NE	1,000,000	1,000,000	
Total suspended solids	µg/L	NE	NE	343,000	66,000	
Turbidity	NTU	NE	NE	195	101	

				LOCATION CODE	AP1-MW02			
				SAMPLE NO	AP3051		AP3071	
				SAMPLE DATE	10-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	76.8	J	68.7	J
Barium	µg/L	730	11,800	252	61	J	53.1	J
Cobalt	µg/L	1.1	12.1	22.2	3	J	3.6	J
Lead	µg/L	15	NE	4.3	-	-	2	B
Manganese	µg/L	88	636	32,300	351		436	
Nickel	µg/L	73	8.6	15.2	**15.2**	J	5.8	J
Selenium	µg/L	18	NE	5.2	4.9	J	3.7	J
Vanadium	µg/L	18	NE	2.9	1.2	J	-	-
Zinc	µg/L	1,100	507	23.2	13.4	J	-	-
METALS-FILTERED								
Aluminum	µg/L	3,700	309	3,320	15.5	J	12.8	J
Barium	µg/L	730	11,800	255	61.7	J	51.6	J
Cobalt	µg/L	1.1	12.1	22.5	3.2	J	3.6	J
Lead	µg/L	15	NE	5.8	2	J	2.2	J
Manganese	µg/L	88	636	32,100	355		410	
Nickel	µg/L	73	8.6	14.8	**14.8**	J	6.1	J
Selenium	µg/L	18	NE	6.9	6.9	J	-	-
Vanadium	µg/L	18	NE	5.9	1.1	J	-	-
Zinc	µg/L	1,100	507	23.4	12.1	J	11.4	J
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	253,000		313,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	897,000		730,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	41	J
Sulfate	µg/L	NE	NE	589,000	589,000		358,000	J
Total dissolved solids	µg/L	NE	NE	1,890,000	1,890,000		1,230,000	
Total suspended solids	µg/L	NE	NE	300,000	23,000		6,000	J
Turbidity	NTU	NE	NE	47	5.4	J	3.4	

				LOCATION CODE	AP1-MW01			
				SAMPLE NO	AP3050		AP3070	
				SAMPLE DATE	7-May-09		4-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Nitrotoluene, 2-	µg/L	0.31	NE	0.18	-	-	0.18	J
Nitrotoluene, 4-	µg/L	4.2	NE	0.17	-	-	0.17	J
VOLATILES								
Chloroform	µg/L	0.19	NE	0.48	0.48	J	-	-
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	26.1	J	191	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	5.4	J
Barium	µg/L	730	11,800	252	28.6	J	37.8	J
Cobalt	µg/L	1.1	12.1	22.2	**22.2**	J	6.8	J
Iron	µg/L	2,600	1,550	4,610	**4,610**		**4,410**	
Lead	µg/L	15	NE	4.3	4.3	J	2.6	B
Manganese	µg/L	88	636	32,300	**32,300**		**8,290**	
Nickel	µg/L	73	8.6	15.2	**13.3**	J	4.1	
Thallium	µg/L	NE	NE	34.6	34.6		-	-
Zinc	µg/L	1,100	507	23.2	23.2		8.6	B
METALS-FILTERED								
Arsenic	µg/L	0.045	7.4	6.2	-	-	6.2	J
Barium	µg/L	730	11,800	255	28.4	J	34.9	J
Cobalt	µg/L	1.1	12.1	22.5	**22.5**	J	5.1	J
Iron	µg/L	2,600	1,550	6,070	**4,590**		**4,990**	
Lead	µg/L	15	NE	5.8	5.8		-	-
Manganese	µg/L	88	636	32,100	**32,100**		**6,270**	
Nickel	µg/L	73	8.6	14.8	**12.8**	J	3.9	J
Thallium	µg/L	NE	NE	37.8	37.8		-	-
Zinc	µg/L	1,100	507	23.4	23.2		9.2	J
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	448,000		395,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	1,020,000		745,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	130	J
Sulfate	µg/L	NE	NE	589,000	585,000		311,000	J
Total dissolved solids	µg/L	NE	NE	1,890,000	1,520,000		1,080,000	
Total suspended soids	µg/L	NE	NE	300,000	-	-	25,000	
Turbidity	NTU	NE	NE	47	8.6		47	

LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- ug/L MICROGRAM PER LITER
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. NO NITROAROMATICS AND/OR SVOCs WERE DETECTED IN PIEZOMETER PZ04 SO NO DATA IS SHOWN.
8. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - B- THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.

FIGURE 3-8

DETECTED CONSTITUENTS AT ASH PIT No. 1 IN OVERBURDEN/ SHALE GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2008, MAY AND NOVEMBER 2009)

ASH PIT No. 1 AND ASH PIT No. 3 REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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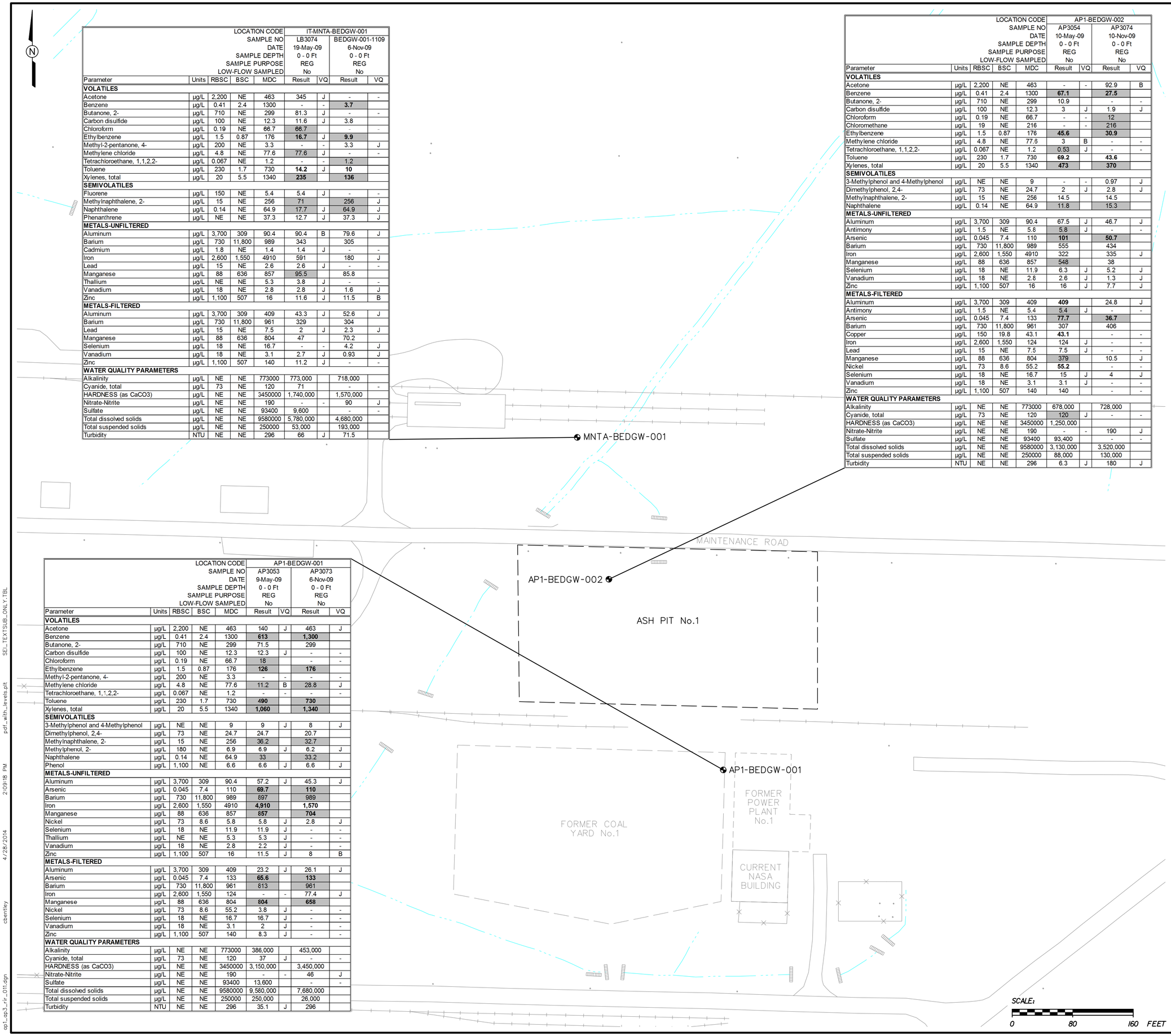

				LOCATION CODE	IT-MNTA-BEDGW-001			
				SAMPLE NO	LB3074		BEDGW-001-1109	
				DATE	19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	345	J	-	-
Benzene	µg/L	0.41	2.4	1300	-	-	**3.7**	
Butanone, 2-	µg/L	710	NE	299	81.3	J	-	-
Carbon disulfide	µg/L	100	NE	12.3	11.6	J	3.8	
Chloroform	µg/L	0.19	NE	66.7	66.7		-	-
Ethylbenzene	µg/L	1.5	0.87	176	**16.7**	J	**9.9**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	3.3	J
Methylene chloride	µg/L	4.8	NE	77.6	77.6	J	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	1.2	
Toluene	µg/L	230	1.7	730	**14.2**	J	**10**	
Xylenes, total	µg/L	20	5.5	1340	**235**		**136**	
SEMIVOLATILES								
Fluorene	µg/L	150	NE	5.4	5.4	J	-	-
Methylnaphthalene, 2-	µg/L	15	NE	256	71		256	J
Naphthalene	µg/L	0.14	NE	64.9	17.7	J	64.9	J
Phenanthrene	µg/L	NE	NE	37.3	12.7	J	37.3	J
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	90.4	B	79.6	J
Barium	µg/L	730	11,800	989	343		305	
Cadmium	µg/L	1.8	NE	1.4	1.4	J	-	-
Iron	µg/L	2,600	1,550	4910	591		180	J
Lead	µg/L	15	NE	2.6	2.6	J	-	-
Manganese	µg/L	88	636	857	95.5		85.8	
Thallium	µg/L	NE	NE	5.3	3.8	J	-	-
Vanadium	µg/L	18	NE	2.8	2.8	J	1.6	J
Zinc	µg/L	1,100	507	16	11.6	J	11.5	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	43.3	J	52.6	J
Barium	µg/L	730	11,800	961	329		304	
Lead	µg/L	15	NE	7.5	2	J	2.3	J
Manganese	µg/L	88	636	804	47		70.2	
Selenium	µg/L	18	NE	16.7	-	-	4.2	J
Vanadium	µg/L	18	NE	3.1	2.7	J	0.93	J
Zinc	µg/L	1,100	507	140	11.2	J	-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	773,000		718,000	
Cyanide, total	µg/L	73	NE	120	71		-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	1,740,000		1,570,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	90	J
Sulfate	µg/L	NE	NE	93400	9,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	5,780,000		4,680,000	
Total suspended solids	µg/L	NE	NE	250000	53,000		193,000	
Turbidity	NTU	NE	NE	296	66	J	71.5	

				LOCATION CODE	AP1-BEDGW-002			
				SAMPLE NO	AP3054		AP3074	
				DATE	10-May-09		10-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	-	-	92.9	B
Benzene	µg/L	0.41	2.4	1300	**67.1**		**27.5**	
Butanone, 2-	µg/L	710	NE	299	10.9		-	-
Carbon disulfide	µg/L	100	NE	12.3	3	J	1.9	J
Chloroform	µg/L	0.19	NE	66.7	-	-	12	
Chloromethane	µg/L	19	NE	216	-	-	216	
Ethylbenzene	µg/L	1.5	0.87	176	**45.6**		**30.9**	
Methylene chloride	µg/L	4.8	NE	77.6	3	B	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	0.53	J	-	-
Toluene	µg/L	230	1.7	730	**69.2**		**43.6**	
Xylenes, total	µg/L	20	5.5	1340	**473**		**370**	
SEMIVOLATILES								
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	-	-	0.97	J
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	2	J	2.8	J
Methylnaphthalene, 2-	µg/L	15	NE	256	14.5		14.5	
Naphthalene	µg/L	0.14	NE	64.9	11.8		15.3	
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	67.5	J	46.7	J
Antimony	µg/L	1.5	NE	5.8	5.8	J	-	-
Arsenic	µg/L	0.045	7.4	110	**101**		**50.7**	
Barium	µg/L	730	11,800	989	555		434	
Iron	µg/L	2,600	1,550	4910	322		335	J
Manganese	µg/L	88	636	857	548		38	
Selenium	µg/L	18	NE	11.9	6.3	J	5.2	J
Vanadium	µg/L	18	NE	2.8	2.6	J	1.3	J
Zinc	µg/L	1,100	507	16	16	J	7.7	J
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	**409**		24.8	J
Antimony	µg/L	1.5	NE	5.4	5.4	J	-	-
Arsenic	µg/L	0.045	7.4	133	**77.7**		**36.7**	
Barium	µg/L	730	11,800	961	307		406	
Copper	µg/L	150	19.8	43.1	**43.1**		-	-
Iron	µg/L	2,600	1,550	124	124	J	-	-
Lead	µg/L	15	NE	7.5	7.5	J	-	-
Manganese	µg/L	88	636	804	379		10.5	J
Nickel	µg/L	73	8.6	55.2	**55.2**		-	-
Selenium	µg/L	18	NE	16.7	15	J	4	J
Vanadium	µg/L	18	NE	3.1	3.1	J	-	-
Zinc	µg/L	1,100	507	140	140		-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	678,000		728,000	
Cyanide, total	µg/L	73	NE	120	120	J	-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	1,250,000			
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	190	J
Sulfate	µg/L	NE	NE	93400	93,400		-	-
Total dissolved solids	µg/L	NE	NE	9580000	3,130,000		3,520,000	
Total suspended solids	µg/L	NE	NE	250000	88,000		130,000	
Turbidity	NTU	NE	NE	296	6.3	J	180	J

				LOCATION CODE	AP1-BEDGW-001			
				SAMPLE NO	AP3053		AP3073	
				DATE	9-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	140	J	463	J
Benzene	µg/L	0.41	2.4	1300	**613**		**1,300**	
Butanone, 2-	µg/L	710	NE	299	71.5		299	
Carbon disulfide	µg/L	100	NE	12.3	12.3	J	-	-
Chloroform	µg/L	0.19	NE	66.7	18		-	-
Ethylbenzene	µg/L	1.5	0.87	176	**126**		**176**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	-	-
Methylene chloride	µg/L	4.8	NE	77.6	11.2	B	28.8	J
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	-	-
Toluene	µg/L	230	1.7	730	**490**		**730**	
Xylenes, total	µg/L	20	5.5	1340	**1,060**		**1,340**	
SEMIVOLATILES								
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	9	J	8	J
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	24.7		20.7	
Methylnaphthalene, 2-	µg/L	15	NE	256	36.2		32.7	
Methylphenol, 2-	µg/L	180	NE	6.9	6.9	J	6.2	J
Naphthalene	µg/L	0.14	NE	64.9	33		33.2	
Phenol	µg/L	1,100	NE	6.6	6.6	J	6.6	J
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	57.2	J	45.3	J
Arsenic	µg/L	0.045	7.4	110	**69.7**		**110**	
Barium	µg/L	730	11,800	989	697		989	
Iron	µg/L	2,600	1,550	4910	**4,910**		**1,570**	
Manganese	µg/L	88	636	857	**857**		**704**	
Nickel	µg/L	73	8.6	5.8	5.8	J	2.8	J
Selenium	µg/L	18	NE	11.9	11.9	J	-	-
Thallium	µg/L	NE	NE	5.3	5.3	J	-	-
Vanadium	µg/L	18	NE	2.8	2.2	J	-	-
Zinc	µg/L	1,100	507	16	11.5	J	8	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	23.2	J	26.1	J
Arsenic	µg/L	0.045	7.4	133	**65.6**		**133**	
Barium	µg/L	730	11,800	961	813		961	
Iron	µg/L	2,600	1,550	124	-	-	77.4	J
Manganese	µg/L	88	636	804	**804**		**658**	
Nickel	µg/L	73	8.6	55.2	3.8	J	-	-
Selenium	µg/L	18	NE	16.7	16.7	J	-	-
Vanadium	µg/L	18	NE	3.1	2	J	-	-
Zinc	µg/L	1,100	507	140	8.3	J	-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	386,000		453,000	
Cyanide, total	µg/L	73	NE	120	37	J	-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	3,150,000		3,450,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	46	J
Sulfate	µg/L	NE	NE	93400	13,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	9,580,000		7,680,000	
Total suspended solids	µg/L	NE	NE	250000	250,000		26,000	
Turbidity	NTU	NE	NE	296	35.1	J	296	

LEGEND:

- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- ug/L — MICROGRAM PER LITER
- NE — NOT ESTABLISHED (RBSCs)
- \- — NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. NO NITROAROMATICS AND/OR SVOCs WERE DETECTED IN PIEZOMETER PZ04 SO NO DATA IS SHOWN.
8. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - B- THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.

FIGURE 3-9

DETECTED CONSTITUENTS AT ASH PIT No. 1 IN BEDROCK GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (MAY AND NOVEMBER 2009)

ASH PIT No. 1 AND ASH PIT No. 3 REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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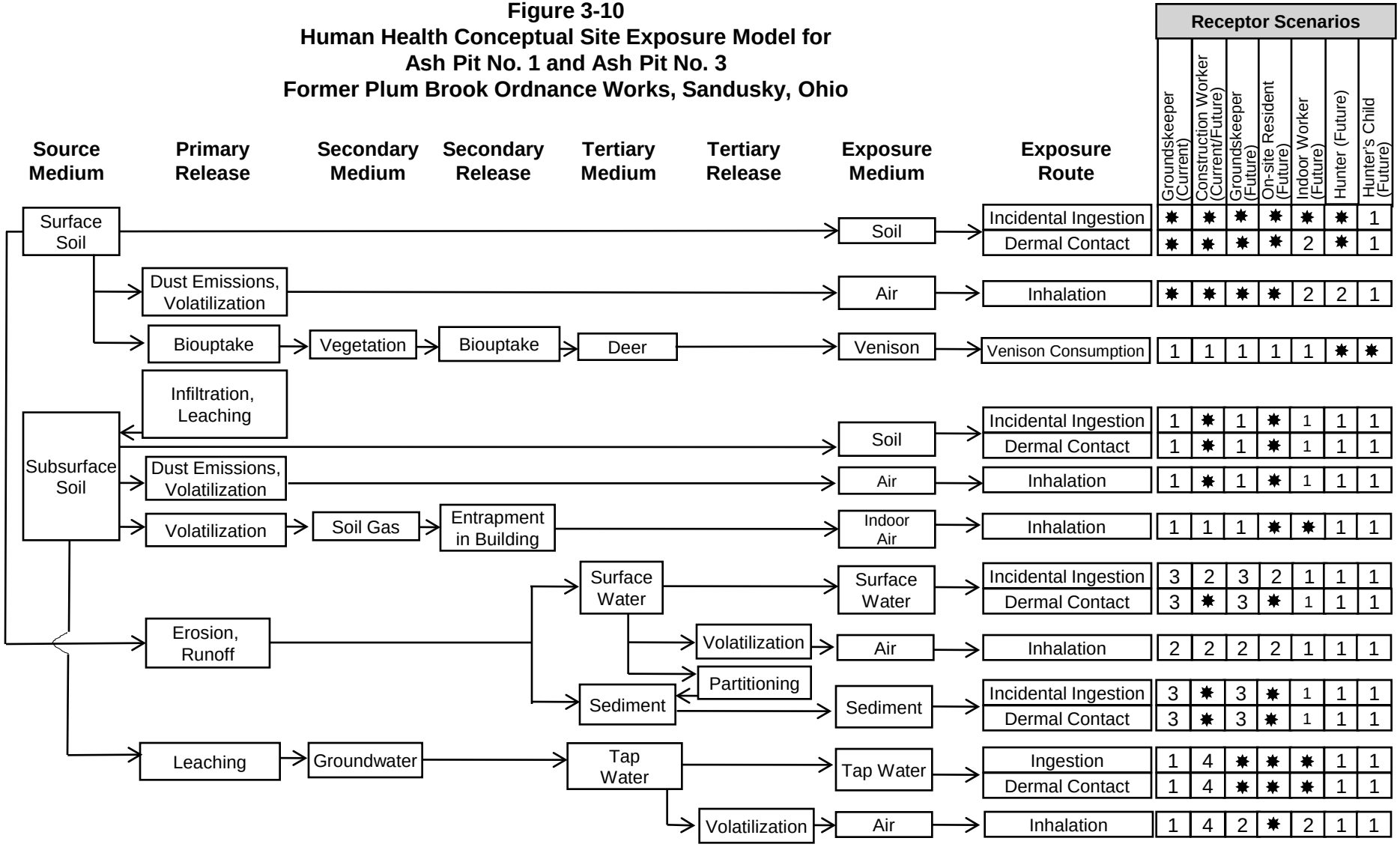
Figure 3-10
Human Health Conceptual Site Exposure Model for Ash Pit No. 1 and Ash Pit No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio



✸ = Complete exposure route quantified in the risk assessment.
1 = There is no plausible pathway for exposure to this medium.
2 = Although theoretically complete, this pathway is not quantified.
3 = Contact with this medium, although plausible, is not part of this receptor's normal or expected activities; therefore contact would be sporadic and is not quantified.
4 = For current use there is no plausible exposure pathway. For future use, the pathway is potentially complete, but is not quantified.

Figure 3-11

Simplified Terrestrial Food Web Conceptual Site Model for Ash Pit No. 1 and Ash Pit No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio

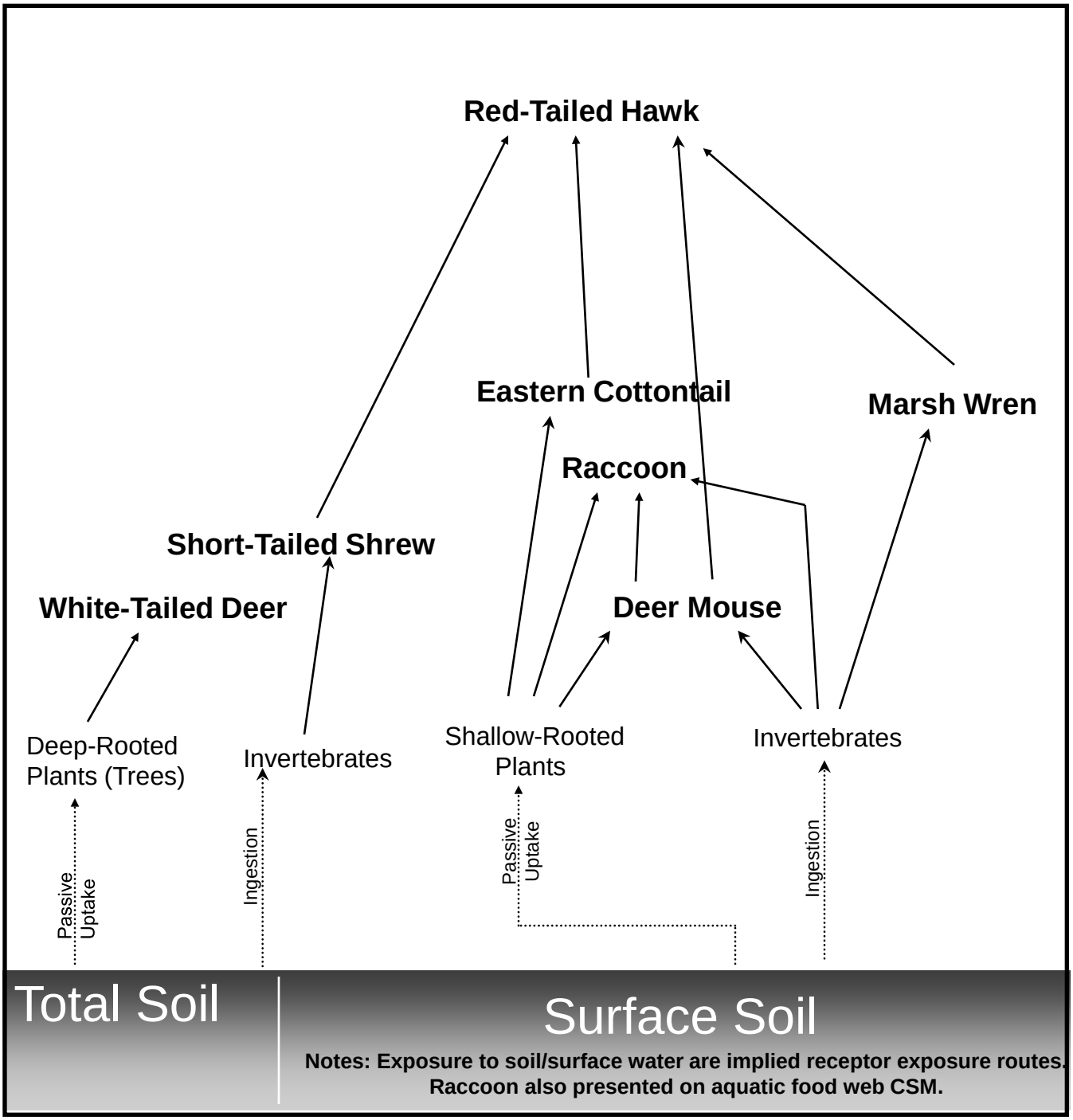
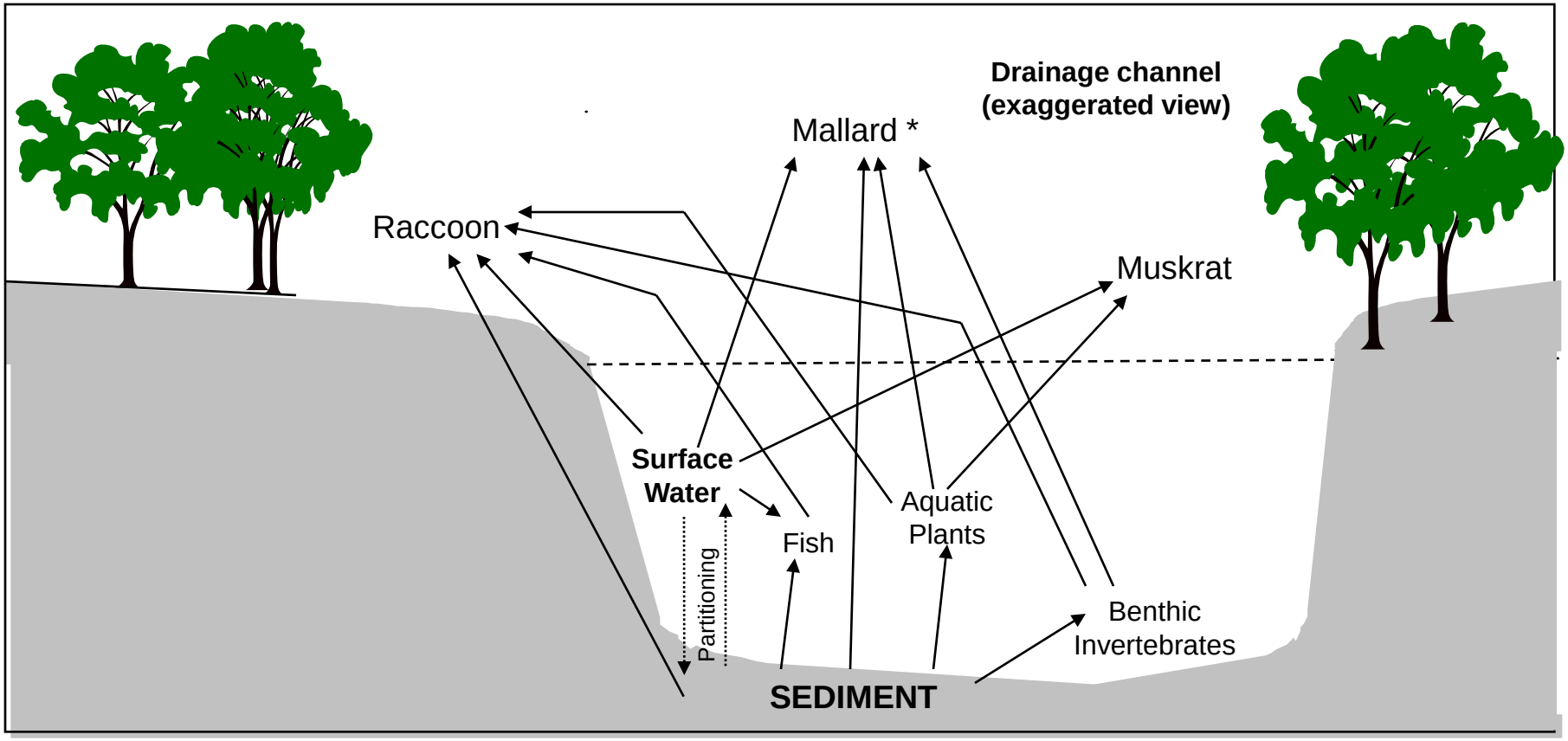


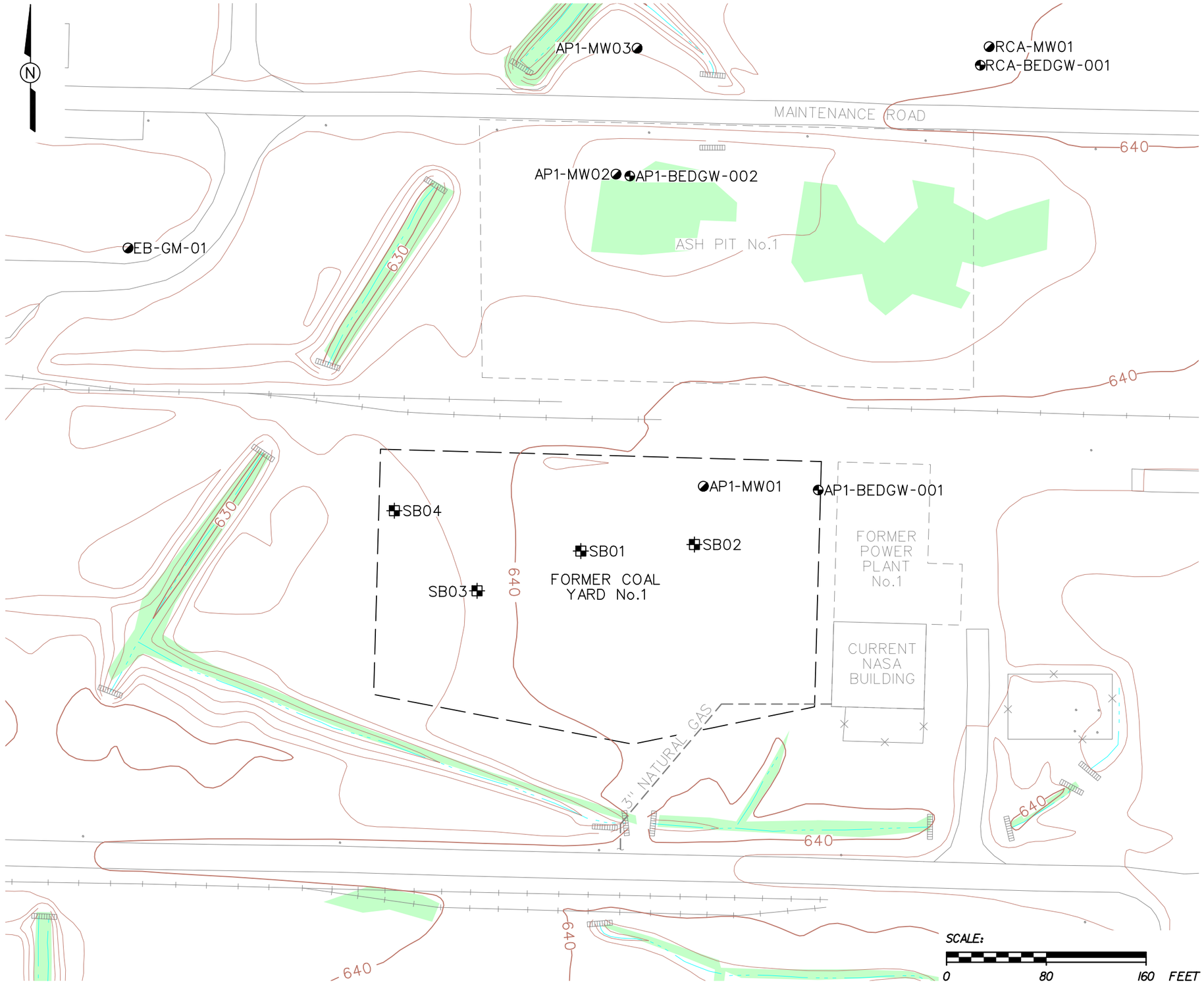
Figure 3-12

Simplified Aquatic Food Web Conceptual Site Model for Ash Pit No. 1 and Ash Pit No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio



Note: The raccoon is also presented on terrestrial food web CSM.

*** = The mallard is not evaluated in the risk assessment.**



LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)
- IDENTIFIED WETLAND (NOTE 2)

NOTES:

1. FORMER COAL YARD No. 1 PERIMETER IS BASED ON HISTORICAL AERIAL PHOTOGRAPHY AND IS APPROXIMATE.
2. WETLAND IDENTIFICATION IS PRELIMINARY PENDING APPROVAL BY THE USACE (ENVIROSCIENCE, 2012). THEREFORE, THEY ARE NOT JURISDICTIONAL WETLANDS AND ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY.

FIGURE 4-1

GENERAL SITE FEATURES OF COAL YARD No. 1 WITH SITE TOPOGRAPHY AND SAMPLING LOCATIONS

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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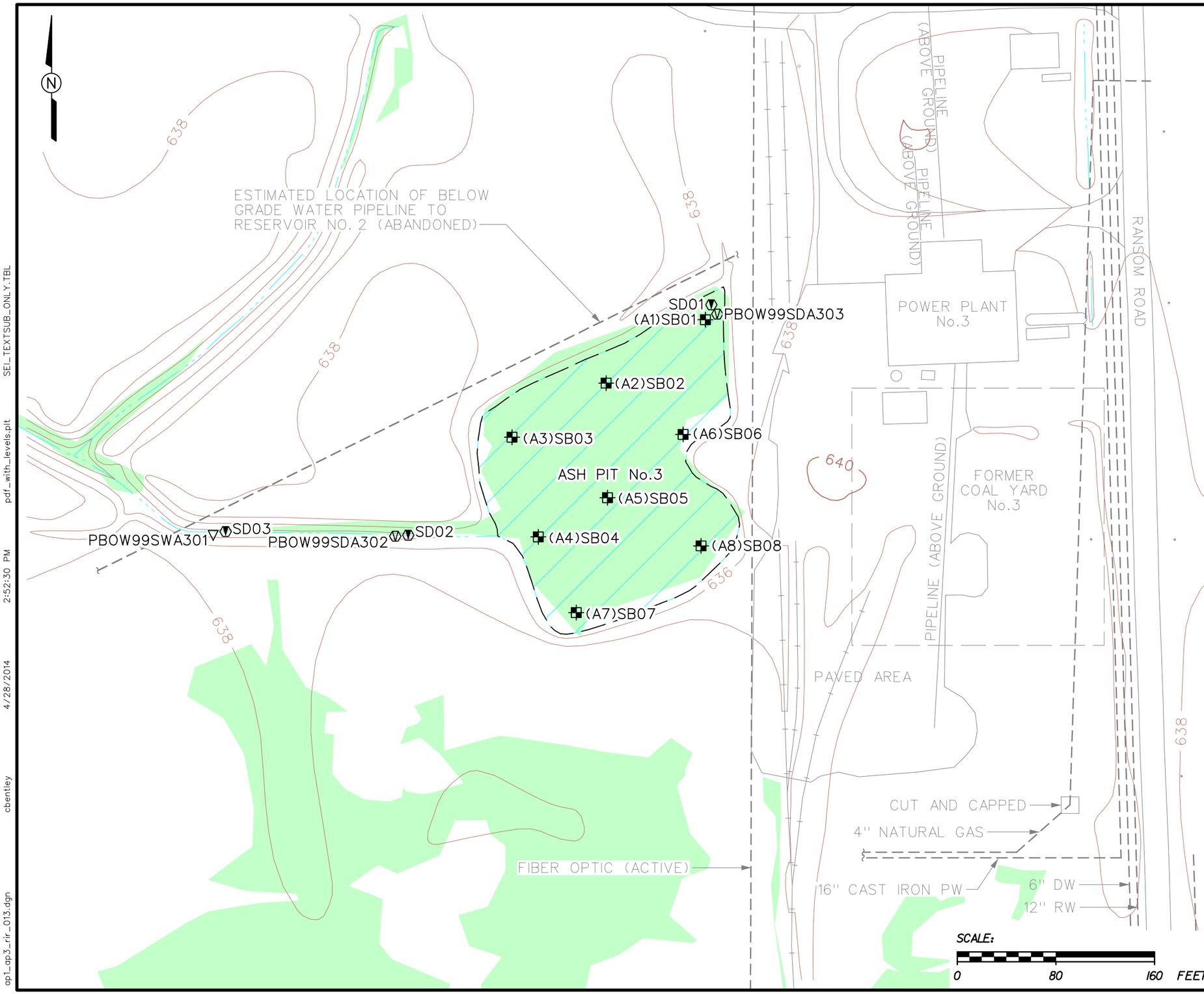

LEGEND:

- PREVIOUS SEDIMENT/SURFACE WATER SAMPLE (USACE, 2000)
- PREVIOUS SURFACE WATER SAMPLE (USACE, 2000)
- SOIL BORING
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)
- INTERMITTENT POND (NOTE 2)
- IDENTIFIED WETLAND (NOTE 3)

NOTES:

1. PREVIOUS SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).
2. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.
3. WETLAND IDENTIFICATION IS PRELIMINARY PENDING APPROVAL BY THE USACE (ENVIROSCIENCE, 2012). THEREFORE, THEY ARE NOT JURISDICTIONAL WETLANDS AND ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY.

FIGURE 5-1

GENERAL SITE FEATURES OF ASH PIT No. 3 WITH SITE TOPOGRAPHY AND SAMPLING LOCATIONS

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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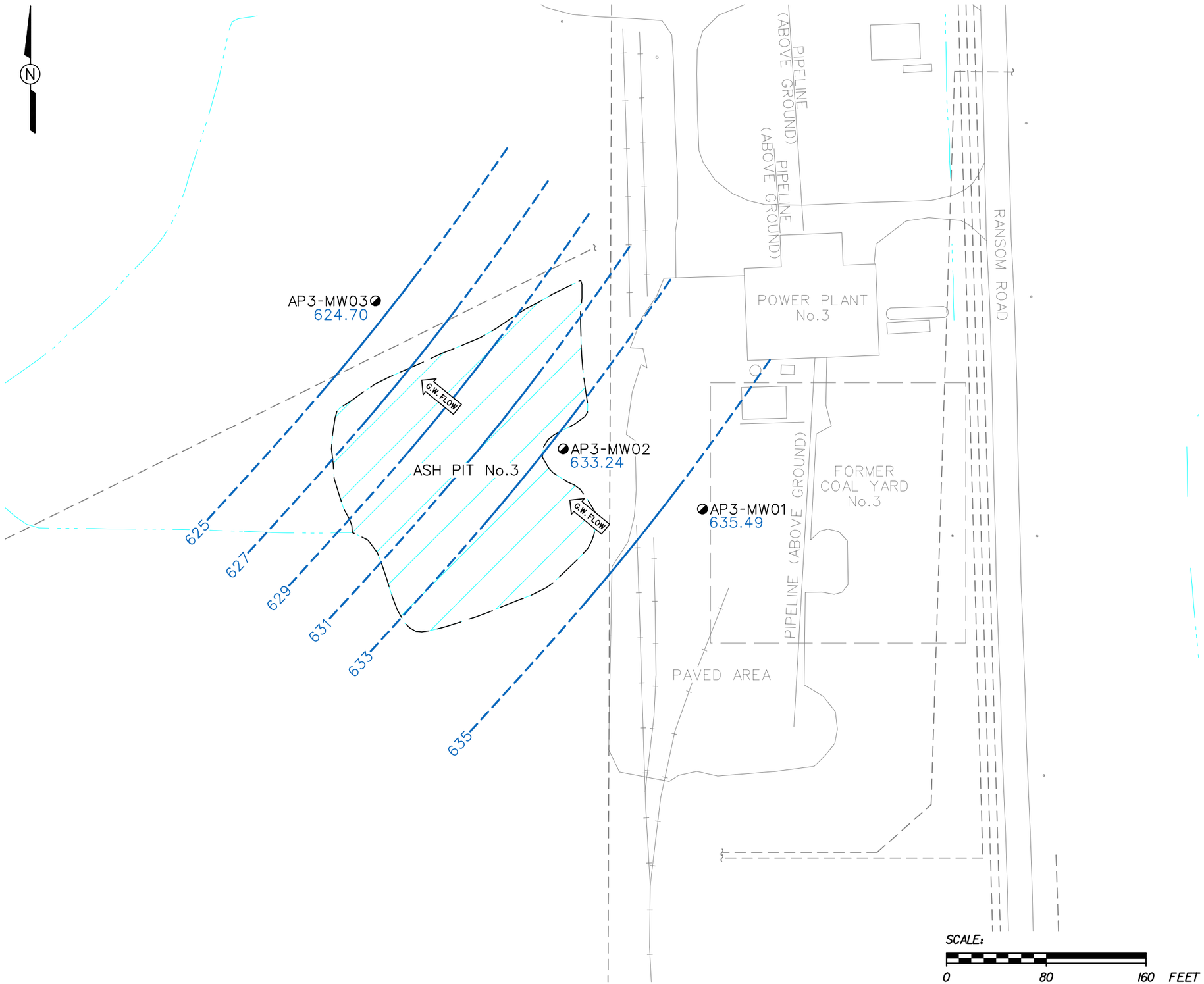

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- INTERMITTENT POND (NOTE 1)
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- 635.49 GROUNDWATER ELEVATION (FT. MSL)
- —635— GROUNDWATER ELEV. CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTE:

1. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

SCALE:

0 80 160 FEET

FIGURE 5-2

ASH PIT No. 3 OVERBURDEN/ SHALE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 2011)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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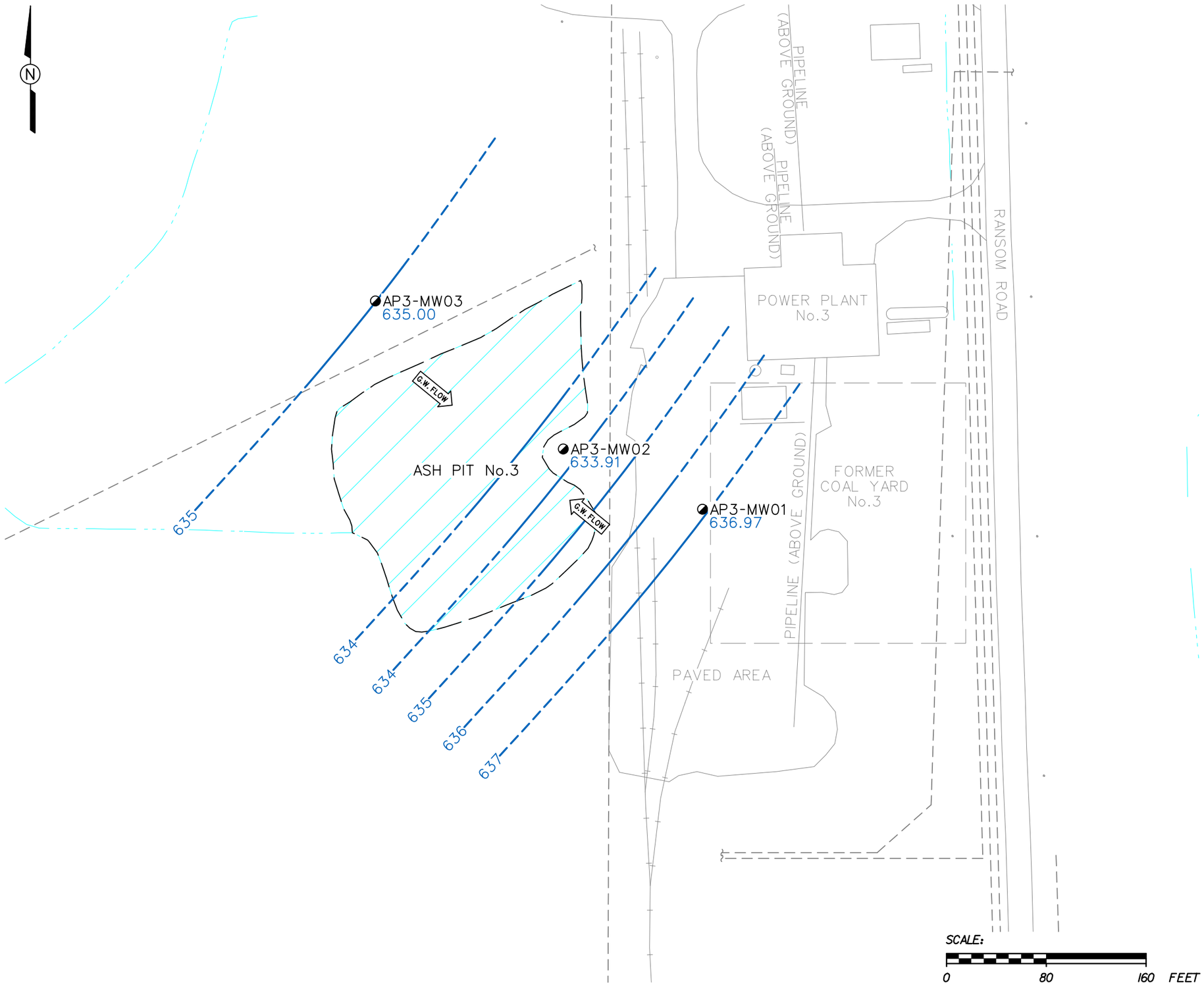

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- INTERMITTENT POND (NOTE 1)
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- 636.97 GROUNDWATER ELEVATION (FT. MSL)
- —635— GROUNDWATER ELEV. CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTE:

1. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

FIGURE 5-3

ASH PIT No. 3 OVERBURDEN/ SHALE GROUNDWATER ELEVATION CONTOUR MAP (DECEMBER 2011)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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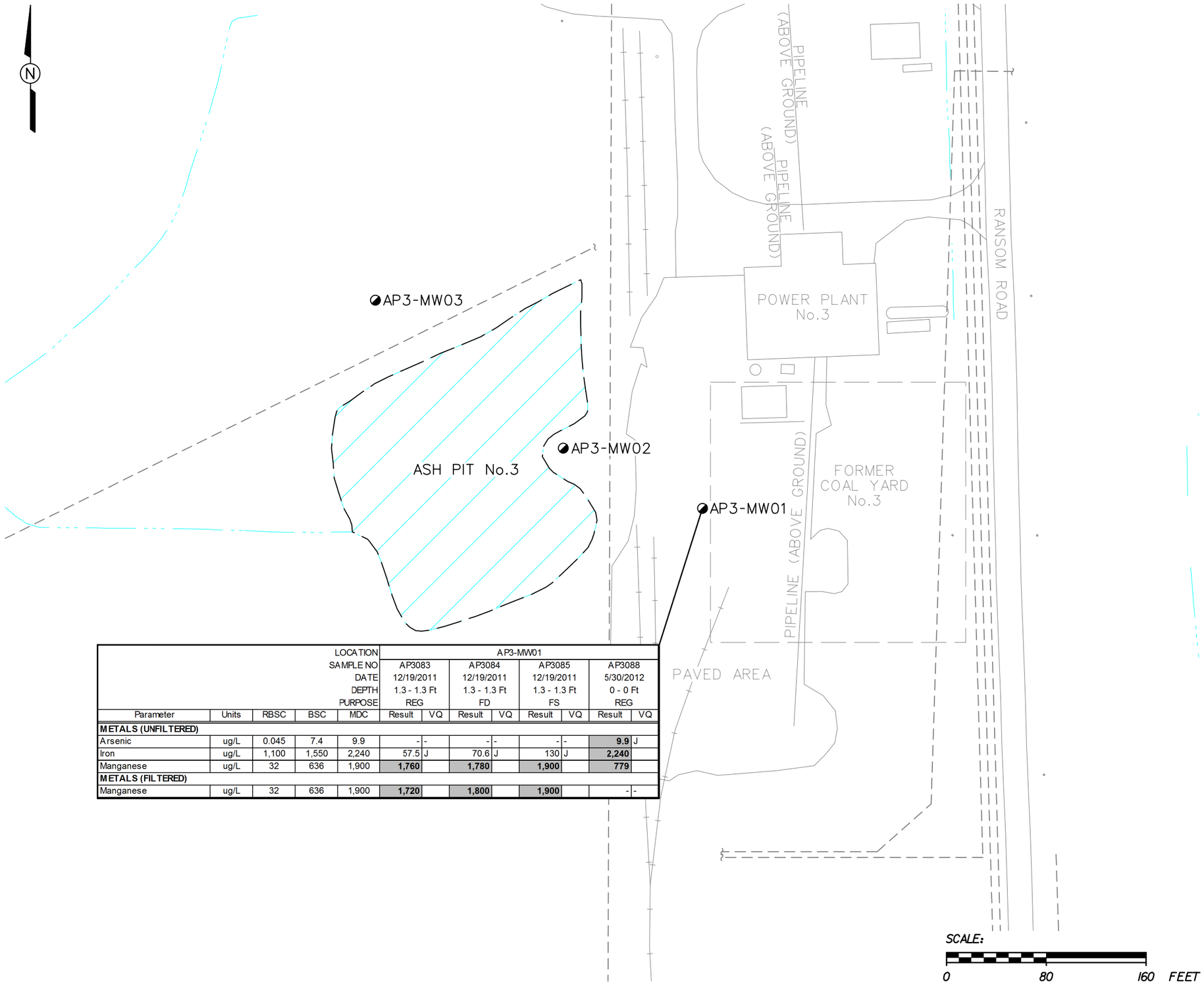

				LOCATION	AP3-MW01							
				SAMPLE NO	AP3083		AP3084		AP3085		AP3088	
				DATE	12/19/2011		12/19/2011		12/19/2011		5/30/2012	
				DEPTH	1.3 - 1.3 Ft		1.3 - 1.3 Ft		1.3 - 1.3 Ft		0 - 0 Ft	
				PURPOSE	REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS (UNFILTERED)												
Arsenic	ug/L	0.045	7.4	9.9	-	-	-	-	-	-	**9.9**	J
Iron	ug/L	1,100	1,550	2,240	57.5	J	70.6	J	130	J	**2,240**	
Manganese	ug/L	32	636	1,900	**1,760**		**1,780**		**1,900**		**779**	
METALS (FILTERED)												
Manganese	ug/L	32	636	1,900	**1,720**		**1,800**		**1,900**		-	-

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- INTERMITTENT POND (NOTE 6)
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- ug/L — MICROGRAMS PER LITER
- NE — NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
- \- — NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BACKGROUND SCREENING CONCENTRATION (BSC).
3. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
4. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
5. VALIDATION QUALIFIERS (VQ):
   J - THE ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS ESTIMATED.
6. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

FIGURE 5-4
DETECTED CONSTITUENTS AT ASH PIT No. 3 IN OVERBURDEN/ SHALE GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2011 AND MAY 2012)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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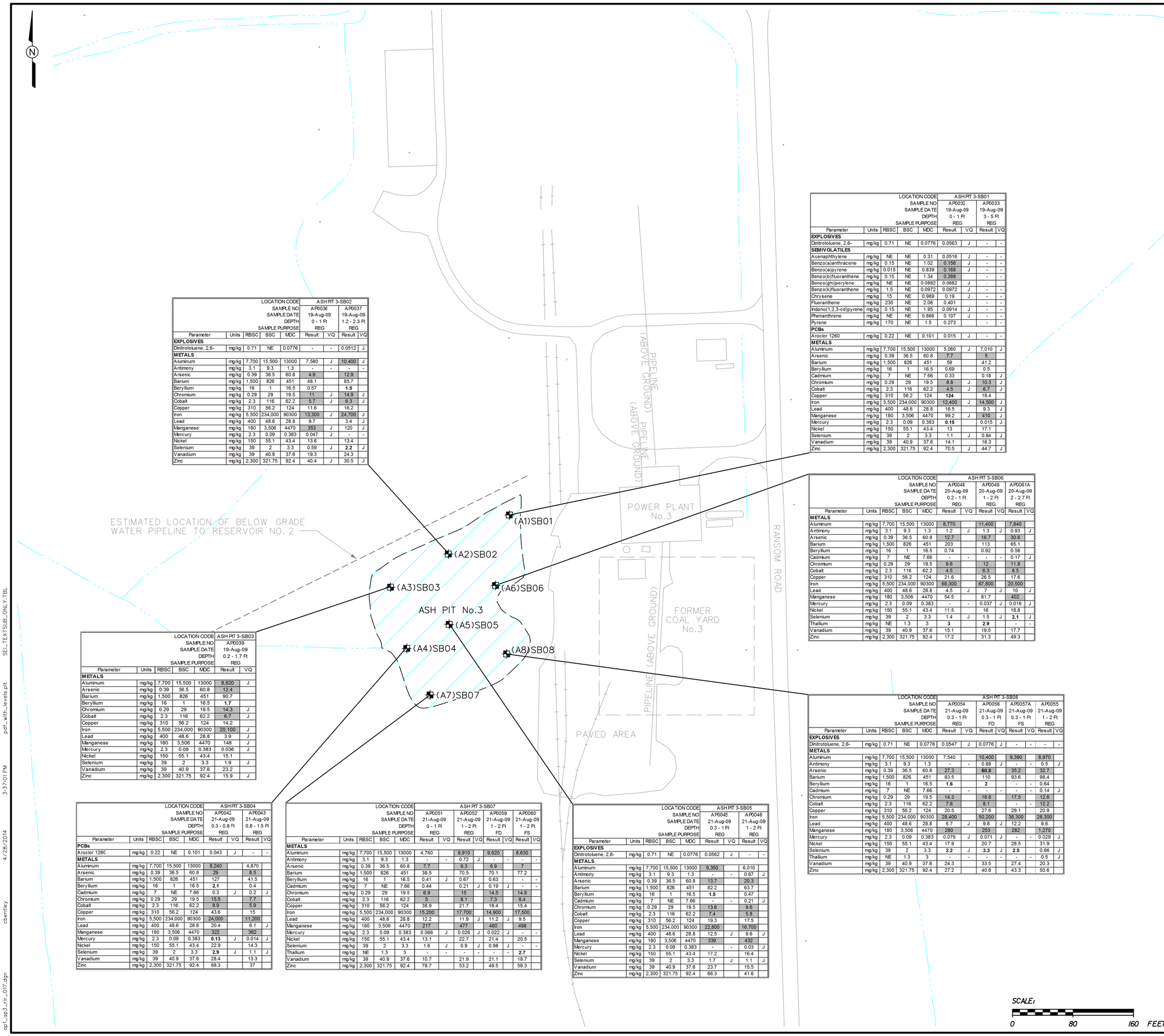

LEGEND:

- SOIL BORING
- INTERMITTENT POND (NOTE 8)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
8. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

				LOCATION CODE	ASH PIT 3-SB01			
				SAMPLE NO	AP0032		AP0033	
				SAMPLE DATE	19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		3 - 5 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0563	J	-	-
SEMIVOLATILES								
Acenaphthylene	mg/kg	NE	NE	0.31	0.0516	J	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	0.156	J	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	0.168	J	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	0.268		-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	0.0882	J	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	0.0972	J	-	-
Chrysene	mg/kg	15	NE	0.989	0.19	J	-	-
Fluoranthene	mg/kg	230	NE	2.06	0.401		-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	0.0914	J	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.107	J	-	-
Pyrene	mg/kg	170	NE	1.5	0.273		-	-
PCBs								
Aroclor 1260	mg/kg	0.22	NE	0.101	0.015	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	5,060	J	7,010	J
Arsenic	mg/kg	0.39	36.5	60.8	7.7		5	
Barium	mg/kg	1,500	826	451	59		41.2	
Beryllium	mg/kg	16	1	16.5	0.69		0.5	
Cadmium	mg/kg	7	NE	7.66	0.33		0.18	J
Chromium	mg/kg	0.29	29	19.5	8.8	J	10.3	J
Cobalt	mg/kg	2.3	116	62.2	4.5	J	6.7	J
Copper	mg/kg	310	56.2	124	**124**		18.4	
Iron	mg/kg	5,500	234,000	90300	12,400	J	14,500	J
Lead	mg/kg	400	48.6	28.8	16.5		9.3	J
Manganese	mg/kg	180	3,506	4470	99.2	J	410	J
Mercury	mg/kg	2.3	0.09	0.383	**0.15**		0.015	J
Nickel	mg/kg	150	55.1	43.4	13		17.1	
Selenium	mg/kg	39	2	3.3	1.1	J	0.84	J
Vanadium	mg/kg	39	40.9	37.6	14.1		16.3	
Zinc	mg/kg	2,300	321.75	92.4	70.5	J	44.7	J

				LOCATION CODE	ASH PIT 3-SB02			
				SAMPLE NO	AP0036		AP0037	
				SAMPLE DATE	19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		1.2 - 2.3 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	0.0512	J
METALS								
Aluminum	mg/kg	7,700	15,500	13000	7,580	J	10,400	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	4.9		12.9	
Barium	mg/kg	1,500	826	451	48.1		85.7	
Beryllium	mg/kg	16	1	16.5	0.57		**1.5**	
Chromium	mg/kg	0.29	29	19.5	11	J	14.9	J
Cobalt	mg/kg	2.3	116	62.2	5.7	J	6.3	J
Copper	mg/kg	310	56.2	124	11.6		16.2	
Iron	mg/kg	5,500	234,000	90300	13,300	J	24,700	J
Lead	mg/kg	400	48.6	28.8	9.7		3.4	J
Manganese	mg/kg	180	3,506	4470	353	J	120	J
Mercury	mg/kg	2.3	0.09	0.383	0.047	J	-	-
Nickel	mg/kg	150	55.1	43.4	13.6		13.4	
Selenium	mg/kg	39	2	3.3	0.59	J	**2.2**	J
Vanadium	mg/kg	39	40.9	37.6	19.3		24.3	
Zinc	mg/kg	2,300	321.75	92.4	40.4	J	30.5	J

				LOCATION CODE	ASH PIT 3-SB03	
				SAMPLE NO	AP0039	
				SAMPLE DATE	19-Aug-09	
				DEPTH	0.2 - 1.7 Ft	
				SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS						
Aluminum	mg/kg	7,700	15,500	13000	8,820	J
Arsenic	mg/kg	0.39	36.5	60.8	12.4	
Barium	mg/kg	1,500	826	451	90.7	
Beryllium	mg/kg	16	1	16.5	**1.7**	
Chromium	mg/kg	0.29	29	19.5	14.3	J
Cobalt	mg/kg	2.3	116	62.2	6.7	J
Copper	mg/kg	310	56.2	124	14.2	
Iron	mg/kg	5,500	234,000	90300	20,100	J
Lead	mg/kg	400	48.6	28.8	3.9	J
Manganese	mg/kg	180	3,506	4470	148	J
Mercury	mg/kg	2.3	0.09	0.383	0.036	J
Nickel	mg/kg	150	55.1	43.4	15.1	
Selenium	mg/kg	39	2	3.3	1.9	J
Vanadium	mg/kg	39	40.9	37.6	23.2	
Zinc	mg/kg	2,300	321.75	92.4	15.9	J

				LOCATION CODE	ASH PIT 3-SB04			
				SAMPLE NO	AP0042		AP0043	
				SAMPLE DATE	21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 0.8 Ft		0.8 - 1.5 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
PCBs								
Aroclor 1260	mg/kg	0.22	NE	0.101	0.043	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	8,240		4,870	
Arsenic	mg/kg	0.39	36.5	60.8	29		8.5	
Barium	mg/kg	1,500	826	451	127		41.5	
Beryllium	mg/kg	16	1	16.5	**2.1**		0.4	
Cadmium	mg/kg	7	NE	7.66	0.3	J	0.2	J
Chromium	mg/kg	0.29	29	19.5	15.5		7.7	
Cobalt	mg/kg	2.3	116	62.2	8.9		5.9	
Copper	mg/kg	310	56.2	124	43.6		15	
Iron	mg/kg	5,500	234,000	90300	24,000		11,200	
Lead	mg/kg	400	48.6	28.8	20.4		8.1	J
Manganese	mg/kg	180	3,506	4470	322		362	
Mercury	mg/kg	2.3	0.09	0.383	**0.13**	J	0.014	J
Nickel	mg/kg	150	55.1	43.4	22.9		14.3	
Selenium	mg/kg	39	2	3.3	**2.9**	J	1.1	J
Vanadium	mg/kg	39	40.9	37.6	28.4		13.3	
Zinc	mg/kg	2,300	321.75	92.4	68.3		37	

				LOCATION CODE	ASH PIT 3-SB07							
				SAMPLE NO	AP0051		AP0052		AP0059		AP0060	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0 - 1 Ft		1 - 2 Ft		1 - 2 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS												
Aluminum	mg/kg	7,700	15,500	13000	4,760		9,910		9,620		8,630	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.72	J	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	7.7		9.3		6.9		7	
Barium	mg/kg	1,500	826	451	38.5		70.5		70.1		77.2	
Beryllium	mg/kg	16	1	16.5	0.41	J	0.67		0.63		-	-
Cadmium	mg/kg	7	NE	7.66	0.44		0.21	J	0.19	J	-	-
Chromium	mg/kg	0.29	29	19.5	6.9		15		14.5		14.8	
Cobalt	mg/kg	2.3	116	62.2	5		8.1		7.3		8.4	
Copper	mg/kg	310	56.2	124	38.9		21.7		19.4		15.4	
Iron	mg/kg	5,500	234,000	90300	15,200		17,700		14,900		17,500	
Lead	mg/kg	400	48.6	28.8	12.2		11.9	J	11.2	J	9.5	
Manganese	mg/kg	180	3,506	4470	217		477		460		498	
Mercury	mg/kg	2.3	0.09	0.383	0.066	J	0.026	J	0.022	J	-	-
Nickel	mg/kg	150	55.1	43.4	13.1		22.7		21.4		20.5	
Selenium	mg/kg	39	2	3.3	1.6	J	0.9	J	0.98	J	-	-
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	**2.7**	
Vanadium	mg/kg	39	40.9	37.6	10.7		21.9		21.1		19.7	
Zinc	mg/kg	2,300	321.75	92.4	78.7		53.2		49.5		59.3	

				LOCATION CODE	ASH PIT 3-SB05			
				SAMPLE NO	AP0045		AP0046	
				SAMPLE DATE	21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0562	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	9,350		6,010	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.67	J
Arsenic	mg/kg	0.39	36.5	60.8	13.7		20.3	
Barium	mg/kg	1,500	826	451	82.2		63.7	
Beryllium	mg/kg	16	1	16.5	**1.5**		0.47	
Cadmium	mg/kg	7	NE	7.66	-	-	0.21	J
Chromium	mg/kg	0.29	29	19.5	13.6		9.6	
Cobalt	mg/kg	2.3	116	62.2	7.4		5.8	
Copper	mg/kg	310	56.2	124	19.3		17.5	
Iron	mg/kg	5,500	234,000	90300	22,800		16,700	
Lead	mg/kg	400	48.6	28.8	12.5	J	9.6	J
Manganese	mg/kg	180	3,506	4470	339		432	
Mercury	mg/kg	2.3	0.09	0.383	-	-	0.03	J
Nickel	mg/kg	150	55.1	43.4	17.2		16.4	
Selenium	mg/kg	39	2	3.3	1.7	J	1.1	J
Vanadium	mg/kg	39	40.9	37.6	23.7		15.5	
Zinc	mg/kg	2,300	321.75	92.4	66.3		41.6	

				LOCATION CODE	ASH PIT 3-SB06					
				SAMPLE NO	AP0048		AP0049		AP0061A	
				SAMPLE DATE	20-Aug-09		20-Aug-09		20-Aug-09	
				DEPTH	0.2 - 1 Ft		1 - 2 Ft		2 - 2.7 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	7,700	15,500	13000	8,770		11,400		7,840	
Antimony	mg/kg	3.1	9.3	1.3	1.2	J	1.3	J	0.93	J
Arsenic	mg/kg	0.39	36.5	60.8	12.7		16.7		30.6	
Barium	mg/kg	1,500	826	451	203		113		65.1	
Beryllium	mg/kg	16	1	16.5	0.74		0.92		0.56	
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	0.17	J
Chromium	mg/kg	0.29	29	19.5	9.6		12		11.8	
Cobalt	mg/kg	2.3	116	62.2	4.5		6.3		8.5	
Copper	mg/kg	310	56.2	124	21.6		26.5		17.6	
Iron	mg/kg	5,500	234,000	90300	68,300		67,800		20,500	
Lead	mg/kg	400	48.6	28.8	4.5	J	7	J	10	J
Manganese	mg/kg	180	3,506	4470	54.5		81.7		402	
Mercury	mg/kg	2.3	0.09	0.383	-	-	0.037	J	0.016	J
Nickel	mg/kg	150	55.1	43.4	11.5		16		18.8	
Selenium	mg/kg	39	2	3.3	1.4	J	1.5	J	**2.1**	J
Thallium	mg/kg	NE	1.3	3	**3**		**2.9**		-	-
Vanadium	mg/kg	39	40.9	37.6	15.1		19.5		17.7	
Zinc	mg/kg	2,300	321.75	92.4	17.2		31.3		49.3	

				LOCATION CODE	ASH PIT 3-SB08							
				SAMPLE NO	AP0054		AP0056		AP0057A		AP0055	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 1 Ft		0.3 - 1 Ft		0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES												
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0547	J	0.0776	J	-	-	-	-
METALS												
Aluminum	mg/kg	7,700	15,500	13000	7,540		10,400		9,390		8,970	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.88	J	-	-	0.5	J
Arsenic	mg/kg	0.39	36.5	60.8	27.3		**60.8**		35.2		32.7	
Barium	mg/kg	1,500	826	451	83.5		110		93.6		98.4	
Beryllium	mg/kg	16	1	16.5	**1.6**		**2**		-	-	0.64	
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	0.14	J
Chromium	mg/kg	0.29	29	19.5	14.3		18.8		17.5		12.6	
Cobalt	mg/kg	2.3	116	62.2	7.6		8.1		-	-	12.2	
Copper	mg/kg	310	56.2	124	20.5		27.6		29.1		20.9	
Iron	mg/kg	5,500	234,000	90300	28,400		50,200		38,300		28,300	
Lead	mg/kg	400	48.6	28.8	6.7	J	9.8	J	12.2		8.6	
Manganese	mg/kg	180	3,506	4470	280		253		282		1,270	
Mercury	mg/kg	2.3	0.09	0.383	0.079	J	0.071	J	-	-	0.029	J
Nickel	mg/kg	150	55.1	43.4	17.9		20.7		28.5		31.9	
Selenium	mg/kg	39	2	3.3	**2.2**	J	**3.3**	J	**2.5**		0.66	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	0.5	J
Vanadium	mg/kg	39	40.9	37.6	24.3		33.5		27.4		20.3	
Zinc	mg/kg	2,300	321.75	92.4	27.2		40.8		43.3		50.6	

FIGURE 5-5
DETECTED CONSTITUENTS AT ASH PIT No. 3 IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (AUGUST 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

SCALE:
0 80 160 FEET

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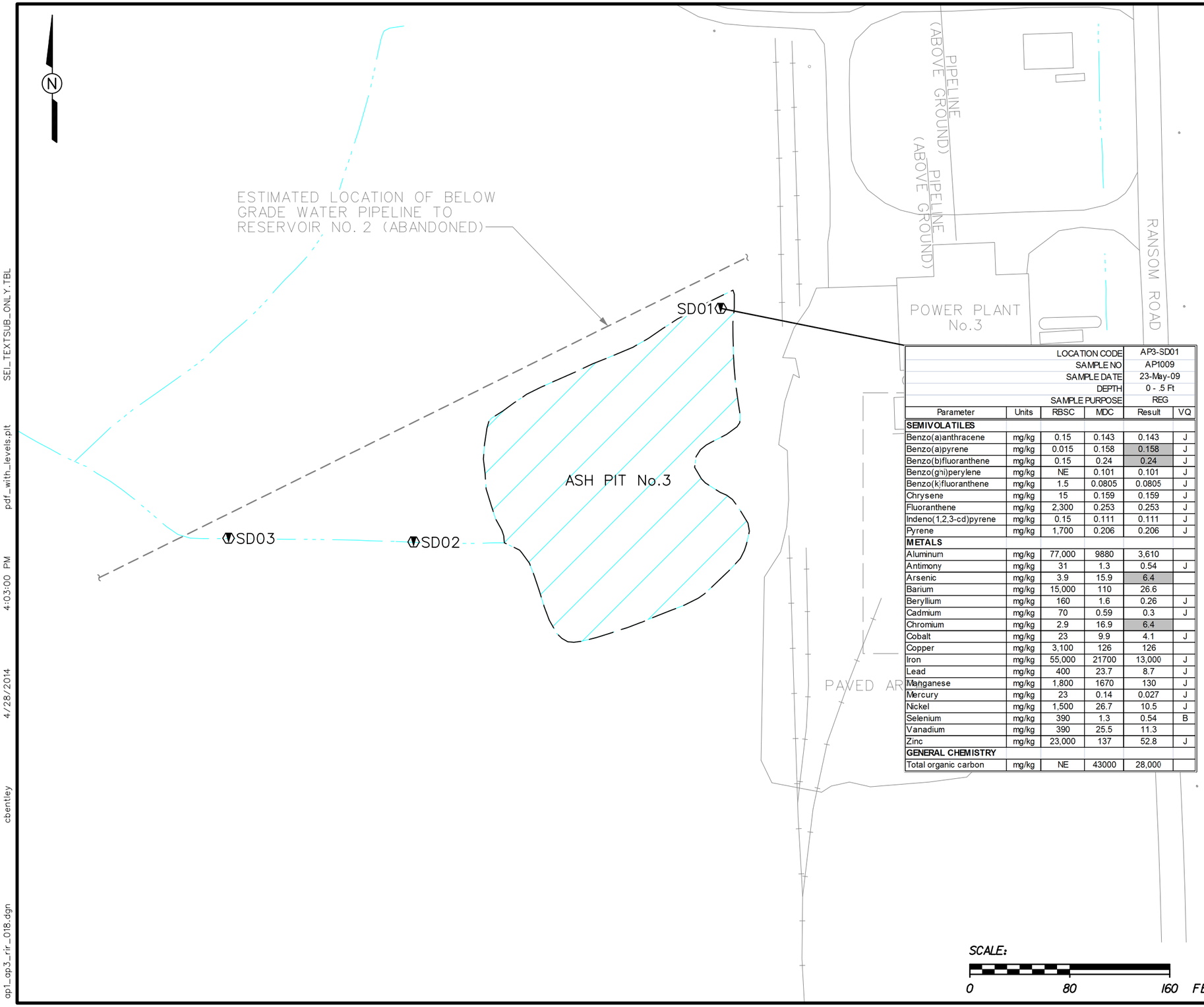

			LOCATION CODE	AP3-SD01	
			SAMPLE NO	AP1009	
			SAMPLE DATE	23-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Benzo(a)anthracene	mg/kg	0.15	0.143	0.143	J
Benzo(a)pyrene	mg/kg	0.015	0.158	0.158	J
Benzo(b)fluoranthene	mg/kg	0.15	0.24	0.24	J
Benzo(ghi)perylene	mg/kg	NE	0.101	0.101	J
Benzo(k)fluoranthene	mg/kg	1.5	0.0805	0.0805	J
Chrysene	mg/kg	15	0.159	0.159	J
Fluoranthene	mg/kg	2,300	0.253	0.253	J
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	0.111	0.111	J
Pyrene	mg/kg	1,700	0.206	0.206	J
METALS					
Aluminum	mg/kg	77,000	9880	3,610	
Antimony	mg/kg	31	1.3	0.54	J
Arsenic	mg/kg	3.9	15.9	6.4	
Barium	mg/kg	15,000	110	26.6	
Beryllium	mg/kg	160	1.6	0.26	J
Cadmium	mg/kg	70	0.59	0.3	J
Chromium	mg/kg	2.9	16.9	6.4	
Cobalt	mg/kg	23	9.9	4.1	J
Copper	mg/kg	3,100	126	126	
Iron	mg/kg	55,000	21700	13,000	J
Lead	mg/kg	400	23.7	8.7	J
Manganese	mg/kg	1,800	1670	130	J
Mercury	mg/kg	23	0.14	0.027	J
Nickel	mg/kg	1,500	26.7	10.5	J
Selenium	mg/kg	390	1.3	0.54	B
Vanadium	mg/kg	390	25.5	11.3	
Zinc	mg/kg	23,000	137	52.8	J
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	28,000	

LEGEND:

- SURFACE WATER/SEDIMENT SAMPLE
- INTERMITTENT POND (NOTE 6)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES ARE BASED ON REGIONAL SCREENING LEVELS AS DESCRIBED IN THE TEXT.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
5. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
6. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

SCALE:

0 80 160 FEET

FIGURE 5-6
DETECTED CONSTITUENTS AT ASH PIT No. 3 IN SEDIMENT SAMPLES ABOVE RBSCs (MAY 2009)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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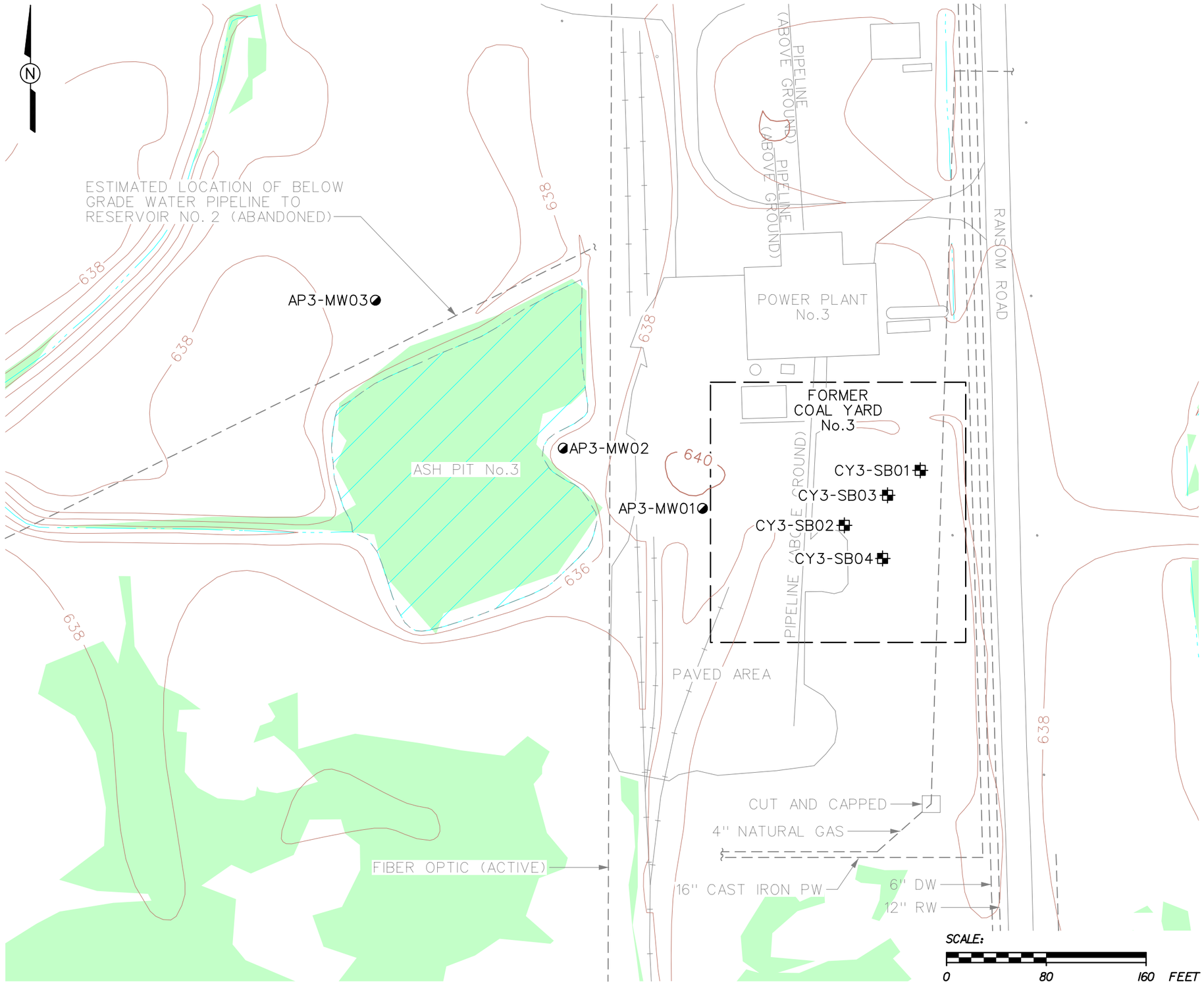

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- SOIL BORING
- INTERMITTENT POND (NOTE 2)
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)
- IDENTIFIED WETLAND (NOTE 3)

NOTES:

1. FORMER COAL YARD NO. 3 PERIMETER IS BASED ON HISTORICAL AERIAL PHOTOGRAPHY AND IS APPROXIMATE.
2. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.
3. WETLAND IDENTIFICATION IS PRELIMINARY PENDING APPROVAL BY THE USACE (ENVIROSCIENCE, 2012). THEREFORE, THEY ARE NOT JURISDICTIONAL WETLANDS AND ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY.

FIGURE 6-1
GENERAL SITE FEATURES OF COAL YARD No. 3 WITH SITE TOPOGRAPHY AND SAMPLING LOCATIONS

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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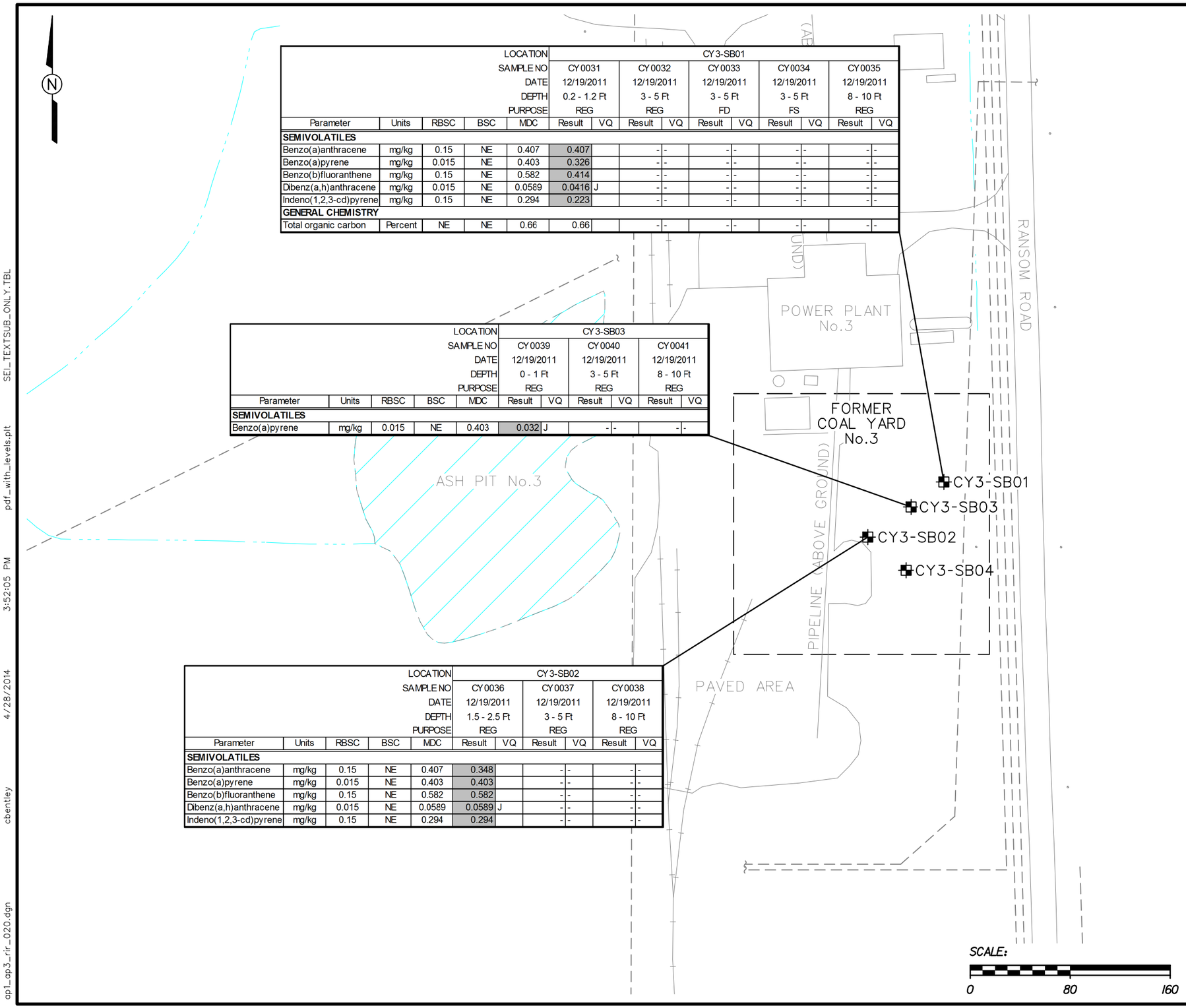

				LOCATION	CY3-SB01									
				SAMPLE NO	CY0031		CY0032		CY0033		CY0034		CY0035	
				DATE	12/19/2011		12/19/2011		12/19/2011		12/19/2011		12/19/2011	
				DEPTH	0.2 - 1.2 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Benzo(a)anthracene	mg/kg	0.15	NE	0.407	0.407		-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.403	0.326		-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.582	0.414		-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.015	NE	0.0589	0.0416	J	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.294	0.223		-	-	-	-	-	-	-	-
GENERAL CHEMISTRY														
Total organic carbon	Percent	NE	NE	0.66	0.66		-	-	-	-	-	-	-	-

				LOCATION	CY3-SB03					
				SAMPLE NO	CY0039		CY0040		CY0041	
				DATE	12/19/2011		12/19/2011		12/19/2011	
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Benzo(a)pyrene	mg/kg	0.015	NE	0.403	0.032	J	-	-	-	-

				LOCATION	CY3-SB02					
				SAMPLE NO	CY0036		CY0037		CY0038	
				DATE	12/19/2011		12/19/2011		12/19/2011	
				DEPTH	1.5 - 2.5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Benzo(a)anthracene	mg/kg	0.15	NE	0.407	0.348		-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.403	0.403		-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.582	0.582		-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.015	NE	0.0589	0.0589	J	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	0.294	0.294		-	-	-	-

LEGEND:

- SOIL BORING
- INTERMITTENT POND (NOTE 6)
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- mg/kg — MILLIGRAMS PER KILOGRAM
- NE — NOT ESTABLISHED (RBSCs), NOT EVALUATED (BSCs)
- \- — NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BACKGROUND SCREENING CONCENTRATION (BSC).
3. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
4. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
5. VALIDATION QUALIFIERS (VQ):
   J - THE ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS ESTIMATED.
6. THE FORMER ASH PIT SOMETIMES CONTAINS WATER AFTER PRECIPITATION EVENTS.

FIGURE 6-2

DETECTED CONSTITUENTS AT COAL YARD No. 3 IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2011)

ASH PIT No. 1 AND ASH PIT No. 3
REMEDIAL INVESTIGATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

CB&I Federal Services LLC

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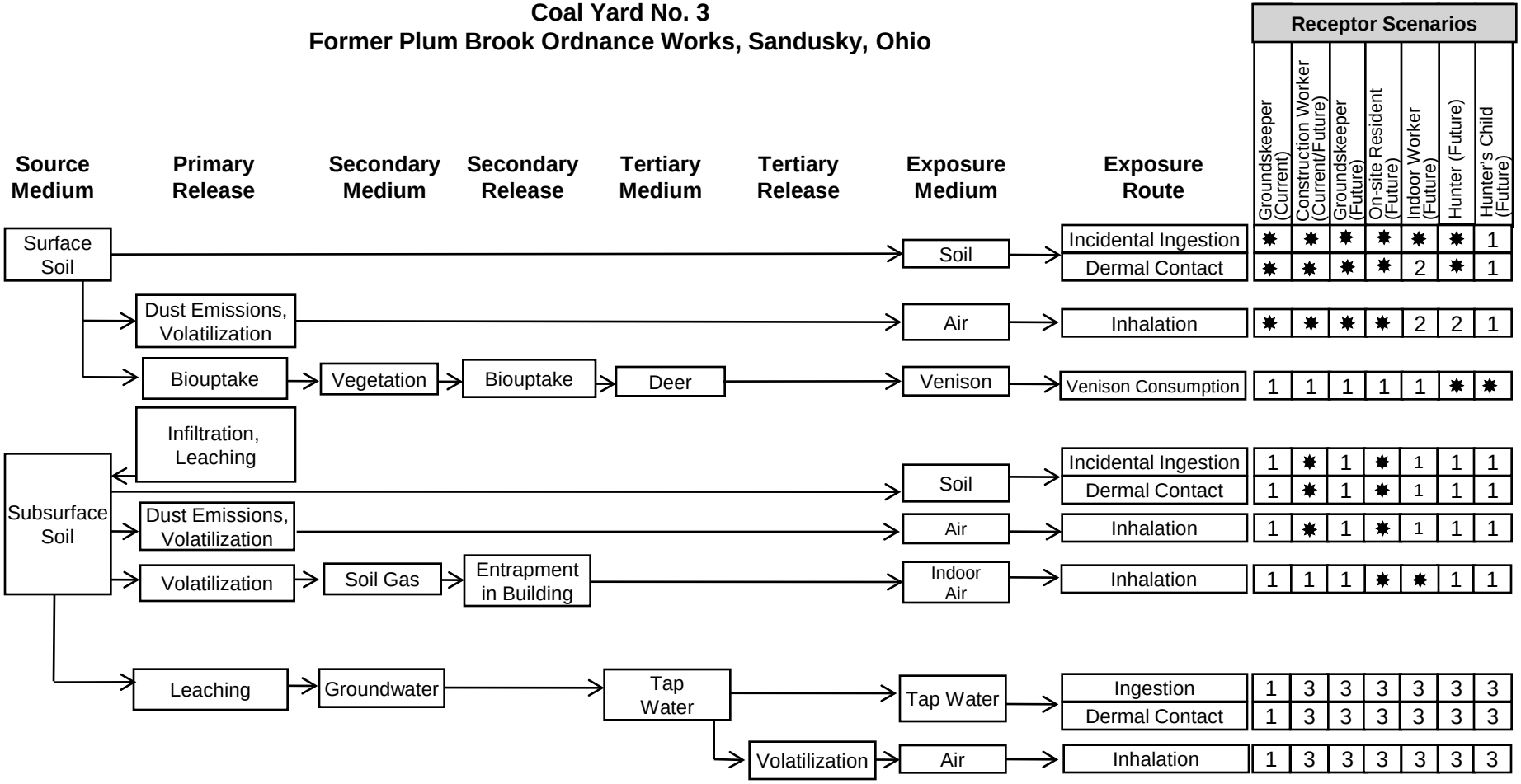
Figure 6-3
Human Health Conceptual Site Exposure Model for Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio



✸ = Complete exposure route quantified in the risk assessment.
1 = There is no plausible pathway for exposure to this medium.
2 = Although theoretically complete, this pathway is not quantified.
3 = Groundwater in the vicinity was evaluated in the Ash Pit No. 3 BHHRA.

APPENDICES A THROUGH K

ELECTRONIC DELIVERABLE ONLY

APPENDIX A

ASH PIT NO. 1 AND ASH PIT NO. 3 SCR

Shaw® a world of Solutions™

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November 4, 2010

U.S. Army Engineer District, Nashville
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110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Submittal of the Final Site Characterization Report for Ash Pit 1 and Ash Pit 3 Former Plum Brook Ordnance Works, Sandusky, Ohio Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013, Shaw is pleased to submit the Final Site Characterization Report for Ash Pit 1 and Ash Pit 3 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio.

Enclosed are four copies of this final report. Copies have also been sent to those on the distribution list, as indicated, for their records. As requested, the document was sent to the Center of Expertise and RAB in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven T. Downey, PE, PMP
Project Manager

Enclosures

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Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Site Characterization Report for Ash Pit 1 and Ash Pit 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 10000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		☐ Originator Developed
☐	RFP		X Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
X	Report	Site Characterization Report	**Document Status**
☐	Risk Assessment / Evaluation		☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
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Final

Ash Pit 1 and Ash Pit 3
Site Characterization Report

Former Plum Brook Ordnance Works
Sandusky, Ohio

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Revision 1

November 2010

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List of Acronyms

amsl	above mean sea level
AOC	areas of concern
AP1	Ash Pit 1
AP2	Ash Pit 2 (former Powerhouse ash pits area)
AP3	Ash Pit 3
bgs	below the ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentrations
D&M	Dames & Moore, Inc.
DNT	dinitrotoluene
DOD	U.S. Department of Defense
DQO	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
FD	field duplicate
FS	field splits
gpm	gallons per minute
HSA	hollow-stem augers
HTRW	hazardous, toxic, and radiological waste
ID	inside diameter
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IT	IT Corporation
MDC	maximum detected concentration
msl	mean sea level
NASA	National Aeronautics and Space Administration
OD	outside diameter
OEPA	Ohio Environmental Protection Agency
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbons
PBOW	Plum Brook Ordnance Works (former)
PBS	Plum Brook Station
PCB	polychlorinated biphenyl
PETN	pentolite

List of Acronyms (Continued)

ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
PRG	preliminary remediation goals
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan (site-wide)
RBC	risk-based concentrations
RBSC	risk-based screening concentrations
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
SB	soil borings
SCR	site characterization report
Shaw	Shaw Environmental, Incorporated
SI	site investigation
SLERA	screening-level ecological risk assessment
SOW	scope of work
SSAP	site-specific sample and analysis plan
SSHP	site-specific safety and health plan
SVOC	semi-volatile organic compound
SW	solid waste
SWSAP	site-wide sampling and analysis plan
SWSHP	Site-Wide Health and Safety Plan Appendix
TAL	target analyte list
TCL	target compound list
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
TOC	total organic carbon
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

Executive Summary

The U.S. Army Corps of Engineers (USACE) is investigating the former Plum Brook Ordnance Works (PBOW) located in Sandusky, Erie County, Ohio. The investigation is under the authorization and funding of the Defense Environmental Restoration Program's Formerly Used Defense Sites. During World War II, the PBOW site was used for the manufacture of nitroaromatics. The former PBOW site is currently operated and maintained by the National Aeronautics and Space Administration (NASA) as Plum Brook Station, an active testing and research installation associated with NASA's John Glenn Research Center of Cleveland, Ohio. The USACE contracted Shaw Environmental, Inc. (Shaw) to conduct a remedial investigation (RI) of the former Ash Pit 1 (AP1) and Ash Pit 3 (AP3) areas. AP1 is located in the central portion of the PBOW facility and AP3 is located in the central, western part of the PBOW facility. During the nitroaromatics manufacturing period, both sites served as an earthen banked impoundment for coal ash slurry from nearby Powerhouses. Powerhouse 1 was located adjacent to AP1 and Powerhouse 3 was located adjacent to AP3. Contamination that may have resulted from these ash pit operations are primarily metals and polycyclic aromatic hydrocarbons.

This Site Characterization Report (SCR) is Volume 1 of a three-volume RI report set for AP1 and AP3. This report details RI activities, including soil, groundwater, sediment, and surface water analytical results and recommendations. Volume 2 is a Baseline Human Health Risk Assessment (BHHRA) Report and Volume 3 is a Screening-Level Ecological Risk Assessment (SLERA) Report, both to be submitted under separate cover.

In 1999, a limited site investigation (SI) was conducted of the surface water, sediment, and surface and subsurface soil for AP1 and of surface water and sediment for AP3 (USACE, 2000). At AP1, six surface (0 to 1 foot) and one subsurface (0 to 4 feet) soil samples were collected from four borings and were analyzed for semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, and geotechnical parameters (Sieve/Atterberg tests); one sample was analyzed for total organic carbon (TOC). Samples were not analyzed for nitroaromatics. No SVOCs were detected above preliminary remediation goals (PRG) derived by the U.S. Environmental Protection Agency (EPA). However, two metals, arsenic and iron, were detected above their PRGs in the surface and subsurface soil and sediment. At AP3, four surface water samples and three sediment samples were collected. Each sample was analyzed for SVOCs and metals. SVOCs were not detected in any of the surface water or sediment samples. No metals were detected above PRG screening levels in any of the surface water samples, but arsenic was

above PRGs in each of the three sediment samples. The SI concluded that based upon metal exceedances in the soil and sediment from AP1 and in the sediment from AP3, further investigation was warranted at both areas to determine if past Department of Defense (DOD) operations had negatively impacted the environment (USACE, 2000).

RI activities were conducted by Shaw at AP1 and AP3 in 2008 and 2009. Twelve direct-push borings were made at AP1, six of which became temporary piezometer installations. Surface water and collocated sediment samples were collected from three locations in the drainage ditch located west of the site, and one was collected from a low-lying wet area in the northern portion of AP1. Three overburden/shale groundwater monitoring wells and two bedrock groundwater monitoring wells were installed in locations that represent upgradient and source area groundwater conditions, and an existing well was used to represent the downgradient groundwater condition. No direct push or monitoring well drilling activities were conducted at AP3 due to a pair of nesting eagles located near the former AP3 (Ohio Department of Natural Resources guidance prohibits operating large machinery within a radius of 660 feet of eagle's nests). However, three surface water and collocated sediment samples were collected and eight soil samples were obtained from hand augered borings.

The analytical results for the various media were compared to risk-based screening concentrations (RBSCs) derived from Oak Ridge National Laboratory-EPA (2010) regional screening levels for a residential land-use scenario. In addition, the analytical results for the metals in the soil samples were compared to 1998 soil background screening concentrations (BSCs). Results for metals in the groundwater samples were compared to 2005 groundwater BSCs. Background levels for the surface water and sediments have not been determined.

ASH PIT 1

Soil. At AP1, 30 soil samples, including Quality Assurance/Quality Control (QA/QC) samples, were collected from the eight direct push borings—10 representative of surface soil (0 to1 foot), 10 from soil approximately 3 to 5 feet below ground surface (bgs) and 10 from soil approximately 8 to10 feet bgs. Each soil sample was analyzed for nitroaromatics, target compound list (TCL) SVOCs, and TAL metals. In addition, soil collected from 0 to1 foot bgs and 3 to 5 feet bgs were analyzed for polychlorinated biphenyl's (PCBs); one surface soil sample (0- to 1-foot interval) was analyzed for TOC. No nitroaromatics were detected in any of the soil samples and no PCBs were detected above RBSCs. In one soil boring, SB-08, in the surface soil,

four polycyclic aromatic hydrocarbons (PAH) compounds—benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene—were detected above their respective RBSCs. This sample was collected from remaining ash. A total of eight metals were detected in both the surface (0 to1 foot bgs) and subsurface (3 to 5 feet and 8 to 10 feet bgs) soil samples. Seven metals (aluminum, arsenic, beryllium, chromium, cobalt, iron, and manganese) were above RBSC limits in the surface soil. Additionally, seven metals (aluminum, arsenic, cadmium, chromium, cobalt, iron, and manganese) were also above the RBSC limits in the subsurface soil. Beryllium and mercury were above BSC values in the surface soil. Beryllium was the only metal to exceed both the RBSC and BSC values in the surface soil. In three subsurface soil samples, beryllium, magnesium, and manganese were above BSC values. Manganese was the only metal to exceed both the RBSC and BSC in the subsurface soil. These results confirm PAHs and metals as the primary soil contaminants at the AP1 site.

Surface Water. Four surface water samples were collected at AP1 and analyzed for nitroaromatics, TCL SVOCs, TAL metals, PCBs, and water quality readings (oxidation-reduction potential [ORP], pH, conductivity, turbidity, dissolved oxygen, and temperature). Surface water samples exhibited no nitroaromatics, SVOCs, or PCB detections. Arsenic, chromium, and lead were the only metals detected above RBSC values, and these results were from the surface water collected in the low-lying, wet area within AP1.

Sediment. Four sediment samples were collected from collocated locations with the surface water samples at AP1. Sediment samples were analyzed for nitroaromatics, SVOCs, PCBs, and metals. In addition, two samples were analyzed for TOC. No nitroaromatics were detected in any sediment sample. No PCBs were above RBSC levels. Two SVOCs, benzo(a)pyrene and benzo(b)fluoranthene, were detected in sample AP1-SD04, which was collected from an area within AP1 where water associated with precipitation events may accumulate seasonally. This location does not represent an aquatic habitat, and this sediment sample may be analogous to surface soil samples collected within AP1. Only two metals, arsenic and chromium, were detected above RBSCs in each of the four samples. Concentrations of arsenic above the RBSC of 0.39 parts per million (ppm) ranged from 4 to 15.9 ppm. Concentrations of chromium above the RBSC of 2.9 ppm ranged from a low of 7.8 ppm to a high of 16.9 ppm. Each of the highest results was from the sample collected in the low-lying, wet area. TOC measurements in the two samples were 21,000 ppm and 43,000 ppm. Since all the sediment samples have the same contaminants, including the upgradient sample (AP-SD01), it is uncertain whether or not the AP1 site has contributed to the sediment contamination.

Piezometer Groundwater. Including QA/QC, six overburden/shale groundwater samples were collected from four of the six piezometers at AP1. Groundwater from two piezometers was collected using the low-flow sampling method. Two piezometer samples were collected prior to dryness and two other piezometers were pumped dry, so no sample was collected. Groundwater from three of the piezometers was analyzed for nitroaromatics, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, and water quality parameters. Due to a limited groundwater supply, one piezometer (PZ04) was able to be analyzed only for nitroaromatics and SVOCs. One nitroaromatic was detected but was well below the RBSC. No SVOCs were detected in any of the samples. Fifteen metals were detected in the overburden/shale groundwater samples from the temporary piezometers, with six (aluminum, chromium, cobalt, iron, manganese, and vanadium) at levels above screening criteria. In each of the three filtered samples, aluminum exceeded its BSC. Iron was above the BSC in two filtered samples, and manganese was above the BSC in one filtered sample. This indicates that the inorganics detected in unfiltered groundwater were mostly associated with suspended particulates. The results from the piezometer groundwater samples suggest that the AP1 site may not have impacted the overburden/shale groundwater zone.

Overburden/Shale Groundwater. Monitoring well sampling from upgradient well (AP1-MW01), source area well (AP1-MW02), and downgradient well (AP1-MW03) occurred in May (wet season) and November (dry season) of 2009. Monitoring well samples were analyzed for the same parameters as the piezometer samples; namely, nitroaromatics, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, total cyanide, and water quality parameters. In addition, volatile organic compounds (VOCs) were included in permanent well sampling.

In May, the overburden/shale wells yielded three complete groundwater samples. In November, the downgradient well did not supply enough water for the collection of the cyanide analysis. During either sampling event, there were no detections of nitroaromatics, SVOCs, or cyanide detected in the source area and downgradient wells. Nitroaromatics were detected in the upgradient well during the month of November but were below respective RBCSs. During the wet season sampling month of May, the VOC chloroform was detected above the RBSC in the upgradient well. Seventeen metals were detected in the overburden/shale permanent monitoring well groundwater samples. Upgradient monitoring well AP1-MW01 exhibited four unfiltered metals (arsenic, cobalt, iron, and manganese) and some filtered metals above respective RBSCs as well as four metals (cobalt, iron, manganese, and nickel) above BSC values. Filtering had little effect, as during both sampling events, the same metals detected in the unfiltered sample

above RBSC and BSC limits were also found in the filtered samples. This indicates that the inorganics detected in groundwater was mostly in the dissolved form. Groundwater from the source area well, AP1-MW02, exhibited the same three metals in the unfiltered and filtered samples above RBSC and/or the BSC limits. Analytical results from downgradient well AP1-MW03 showed the same results for the May and November sampling events in both the unfiltered and filtered samples, with the exception of chromium and iron detected in the filtered sample during the dry season (November) sampling event and background exceedances of aluminum, iron, and nickel. Aluminum also was above the BSC during the May sampling event. Filtration had little effect on the groundwater on either sampling date, indicating that inorganics detected in groundwater were mostly in the dissolved phase. These results, when taken with the soils data, suggest the overburden/shale groundwater may have been impacted at the AP1 site; but groundwater from the source area well appeared less impacted than either the upgradient well or downgradient well.

Bedrock Groundwater. Monitoring well sampling from upgradient well AP1-BEDGW-001, source area well AP1-BEDGW-002, and downgradient well IT-MNTA-BEDGW-001 occurred in May (wet season) and November (dry season) of 2009. Three complete groundwater sample sets were collected from each of the bedrock wells during each sampling event, although no groundwater samples were able to be collected using the low-flow sampling methodology. As with the overburden/shale monitoring wells, bedrock groundwater samples were analyzed for nitroaromatics, VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, total cyanide, and water quality parameters.

No nitroaromatics were detected in any of the bedrock groundwater samples. Twelve VOCs were detected, and eight (benzene, chloroform, chloromethane, ethylbenzene, methylene chloride, 1,1,2,2-tetrachloroethane, toluene, and total xylenes) were at levels above their RBSC. Eight SVOCs were detected; however, only two (2-methylnaphthalene and naphthalene) were at levels exceeding the RBSC. Eighteen metals were detected in the bedrock groundwater samples; and antimony, arsenic, barium, and manganese were above the respective RBSC in both the unfiltered and filtered samples. In the unfiltered sample, iron exceeded the RBSC only during the May sampling event. BSC screening levels were exceeded by ten metals. Most of the metals were above the RBSC and/or BSC levels in the upgradient and source area wells. Only the manganese RBSC was exceeded during the wet season sampling event in the unfiltered sample and BSC values were exceeded only by magnesium and potassium. Of three cyanide detections,

one exceeded the RBSC of 73 ppb in source area well AP1-BEDGW-002, with a concentration of 120 ppb.

Considering the contaminants found in the soils and overburden/shale groundwater samples and considering that most of the VOC contamination was associated with natural hydrocarbon typical of the Delaware Limestone bedrock, the AP1 site does not appear to have had any impact on the bedrock groundwater.

ASH PIT 3

Soil. At AP3, a total of 21 soil samples (including the QA/QC samples) were collected from the eight hand-augered borings—8 representative of surface soil (0 to 1 foot) and 13 from soil approximately 3 to 5 feet bgs. Total depths ranged from 1.5 to 5 feet bgs. Soil samples were collected from material within and below an encountered ash layer. Soil samples were analyzed for nitroaromatics, SVOCs, metals, and PCBs. No nitroaromatics or PCBs were above RBSCs. SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were detected above RBSCs in the surface soil sample from boring SB-01, and SVOCs benzo(a)anthracene and indeno(1,2,3-cd)pyrene were detected above RBSCs in the 3 to 5 feet bgs interval from boring SB-08. Six metals were detected above RBSC levels in the surface and subsurface soil samples, including aluminum, arsenic, chromium, cobalt, iron, and manganese. Six metals (arsenic, beryllium, copper, mercury, selenium, and thallium) were above BSC values in the surface soils; but arsenic was the only metal in the surface soil to exceed both the RBSC and BSC. Three metals (beryllium, calcium, and magnesium) were above BSC values in the subsurface soils. These results confirm PAHs and metals as the primary soil contaminants at the AP3 site.

Surface Water. Three surface water samples were collected at AP3 near 1999 SI sample locations and were analyzed for only nitroaromatics and water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature). All three surface water samples exhibited no nitroaromatic detections. With no SVOC or metal detections exhibited from the 1999 SI results and no nitroaromatic detections during the RI, results conclude that the surface water at AP3 is not impacted from past DOD operations.

Sediment. Three sediment samples were collected from collocated locations with the surface water samples at AP3. One sediment sample, AP3-SD01, was analyzed for nitroaromatics, SVOCs, PCBs, metals, and TOC. The remaining two sediment samples were analyzed for only nitroaromatics and PCBs. No nitroaromatics or PCBs were detected in any sediment sample. In

sample AP3-SD01, only two SVOCs, benzo(a)pyrene (0.158 ppm) and benzo(b)fluoranthene (0.24 ppm) exceeded the respective RBSCs of 0.015 ppm and 0.15 ppm. This sample was collected from an area within AP3 where water associated with precipitation events collects and which is not an aquatic habitat. Excluding essential human macronutrients (i.e., calcium, chloride, magnesium, phosphorous, potassium, and sodium), 17 metals were detected. Only arsenic and chromium exceeded RBSCs. Arsenic was above the RBSC of 0.39 ppm at a concentration of 6.4 ppm, and chromium was above the RBSC of 2.9 ppm with a concentration of 6.4 ppm. TOC was measured at 28,000 ppm.

The installation of piezometers and monitoring wells at AP3 would have required significant habitat destruction for access and may have exposed potential ecological receptors to the ash layer. In addition, underground utilities were present that further limited intrusive activities north and east of the site. Although groundwater data from the site is not available, conclusions concerning potential leaching to groundwater can be inferred from similar PBOW sites, specifically AP1 and AP2. Both sites are similar to AP3, with ash layers detected near the surface and containing similar site-related compounds (PAHs and metals). In addition, shallow depth to groundwater was noted at all three ash pits. Evaluation of the data from AP1 and AP2 indicates that while contaminants are present in the ash layer, appreciable impacts to groundwater have not been observed. This lack of impact likely is due to the limited mobility of PAHs and metals. Given these findings for AP1 and AP2, further investigation of AP3 groundwater is not warranted.

Recommendations:

- Given the detections of contaminants above screening criteria in the soil, sediment, overburden/shale groundwater, and bedrock groundwater samples from the AP1 and soil at the AP3 area, a BHHRA and an SLERA should be conducted using the SI and the RI data.

- While several VOCs and SVOCs were detected above the RBSCs and/or BSCs in the groundwater in the bedrock wells, the detected VOCs appear to be related to naturally occurring petroleum hydrocarbons. Therefore, no further sampling of bedrock groundwater is warranted.

Planned Activities

- Completion of the BHHRA and SLERA reports (final reports are anticipated in January 2011).

1.0 Introduction

The U.S. Army is conducting a study of the environmental impact of a suspected hazardous waste site at a property previously owned by the U.S. Department of Defense (DOD). The former Plum Brook Ordnance Works (PBOW), located in Sandusky, Erie County, Ohio, is currently being investigated under the Defense Environmental Restoration Program for Formerly Used Defense Sites. Figure 1-1 shows the geographical location of the former PBOW site. This former 9,000-acre facility was used for the manufacture of nitroaromatics during World War II. The National Aeronautics and Space Administration (NASA) operates and maintains the site as the Plum Brook Station (PBS) of the John Glenn Research Center.

The investigation is being managed and technically overseen by the Nashville, Tennessee, and Huntington, West Virginia, District Offices of the U.S. Army Corps of Engineers (USACE). Fieldwork and reporting for Ash Pit 1 (AP1) and Ash Pit 3 (AP3) are performed under Delivery Order DX02 for the USACE Louisville Architecture/Engineering Environmental Services Indefinite Delivery/Indefinite Quantity, Contract Number W912DR-08-D-0013. Shaw Environmental, Inc. (Shaw) was contracted by the USACE Nashville District to conduct a soil, groundwater, surface water, and sediment remedial investigation (RI) at the former AP1 and AP3 disposal areas.

This Site Characterization Report (SCR) of AP1 and AP3 is Volume 1 of three planned volumes. Volume 1, which consists of text, tables, figures, and appendices, presents final evaluations, conclusions, and recommendations for the AP1 and AP3 disposal area RI. Background and risk-based screening criteria (Section 4.2) will be used as a comparison and evaluation tool for analytical results. Volume 2 will be the baseline human health risk assessment (BHHRA) and Volume 3 will be the screening level ecological risk assessment (SLERA). Each volume will be submitted under separate covers. The BHHRA and SLERA reports will be prepared by Shaw and will describe the potential human health and ecological risks/hazards with respect to the investigation areas.

Groundwater sampling (conducted only at AP1) was performed to determine the overburden/shale and bedrock groundwater quality. To determine if water quality could be affected by seasonal changes, groundwater sampling was timed to monitor potential seasonal precipitation fluxes. As noted in the *2004 Groundwater Data Summary and Evaluation Report*

(Shaw, 2005), the evaluation of precipitation data specifically in the Sandusky area determined that two general seasons existed in reference to groundwater recharge—a wet season (January through June) and a dry season (July through December).

In addition, quarterly groundwater elevation measurements were conducted for the USACE (2010) to support ongoing investigation and remediation activities at PBOW. This information (Owens, 2010), critical to the evaluation of groundwater flow and contaminant transport, is incorporated into this report.

The field activities completed by Shaw for investigation of AP1 and AP3 were conducted pursuant to the following documents:

General Site Activities

- Site-Wide Accident Prevention Plan/Site-Wide Health and Safety Plan Appendix (SWSHP) (Shaw, 2008a)
- Site-Wide Sampling and Analysis Plan (SWSAP) (Shaw, 2008b)
- Site-Wide Quality Assurance Project Plan (QAPP) (Shaw, 2008c).

Site-Specific Activities

- Work Plan, Phase 1 Remedial Investigation, Waste Water Treatment Plants 1 and 3 and Ash Pits 1 and 3, Site-Specific Sampling and Analysis Plan (SSAP), and Site-Specific Safety and Health Plan (SSHP), (Shaw, 2008d).
- Work Plan, Phase 2 Remedial Investigation, Waste Water Treatment Plants 1 and 3 and Ash Pits 1 and 3, Site-Specific Sampling and Analysis Plan, and Site-Specific Safety and Health Plan, (Shaw, 2009a).

1.1 Scope of Work and Project Objectives

The scope of the RI included preparation of a quality control plan and a Phase 1, site-specific addenda to the SWSHP and SWSAP that included soil sampling and installation of temporary piezometers. Based upon Phase 1 analytical data evaluation, a Phase 2 SSAP and SSHP were developed, which included installation of permanent monitoring wells, monitoring well development, groundwater sampling, analytical work, and investigation-derived waste (IDW) management and disposal. Figure 1-2 identifies AP1 and AP3 locations in relation to site features and other areas of concern.

The objectives of this investigation include the following:

- Evaluate and use existing data appropriate to the areas of concern (AOC)
- Define site physical features and characteristics
- Determine the nature and extent of DOD-related contamination in soil and groundwater at the AOCs
- Determine chemical characteristics of contamination
- Evaluate fate and transport of contamination
- Determine if overburden groundwater underlying the AOC is in sufficient volume and quality to be defined as a potential drinking water source in the State of Ohio
- Obtain site data of quality, quantity, and distribution appropriate for site characterization, risk assessment, and feasibility study.

1.2 Report Organization

Chapter 2.0 of this report describes PBOW and the AP1 and AP3 sites, including their physical setting, geology, and hydrogeology features. Sampling strategy and field procedures are described in Chapter 3.0. The analytical program and background comparison data are presented in Chapter 4.0. Chapter 5.0 describes site-specific information and historic and current analytical data. Chapter 6.0 presents media conclusions. Recommendations are provided in Chapter 7.0. References that were used in preparing the report are listed in Chapter 8.0.

Soil boring, monitoring well drill logs, well construction diagrams, sample collection logs, and rock core photographs are provided in Appendices A, B, and C, respectively. Well development water photographs and logs are included in Appendix D. Appendix E contains land survey data. Appendix F presents copies of wastes manifests used for disposal of the IDW. Appendices G through J contain analytical data pertinent to the soil sampling and two groundwater (May and November 2009) sampling events. Appendix K presents the chains of custody for laboratory analysis. Appendix L provides incoming comments and responses.

1.3 Facility Location and Description

The former PBOW site is currently utilized and maintained by NASA and is operated as the PBS, a satellite office of the NASA John Glenn Research Center located at Lewis Field in

Cleveland, Ohio. Most of the aerospace testing facilities built at the site in the 1960s are on standby or inactive status. The site is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. Although primarily in Perkins and Oxford Townships, the eastern edge of the site extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S Highway 250. The areas surrounding PBOW are mostly agricultural and residential. Public access is restricted at PBOW except during the annual deer hunting season.

1.4 PBOW Site History and Potential for Contamination

The PBOW site was built in early 1941 and manufactured 2,4,6- trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite (PETN). Production of explosives began in December 1941 and continued until 1945. During operation, three areas (TNT Area A [TNTA], TNT Area B [TNTB], and TNT Area C [TNTC]) manufactured TNT and DNT, and one area manufactured PETN. TNTA consisted of manufacturing lines 1 through 4, TNTB consisted of lines 5 through 7, and TNTC consisted of lines 8 through 12. TNTA is located on the northeast side of PBOW, TNTB is located at the southern central part, and TNTC is located at the southwestern side of PBOW. The PETN manufacturing area is located in the north-central portion of PBOW and lies within the boundaries of Ransom Road on the west, Pentolite Road on the south, and Patrol Road on the north and east. The central portion of the former PETN manufacturing area is occupied by NASA's inactive nuclear reactor, which is in the process of being decommissioned.

It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. After the plant was shut down, decontamination of the processing lines began. Decontamination was considered complete during the last quarter of 1945. The property was initially transferred to the Ordnance Department after it was certified by the Army to be decontaminated in 1946. This transfer did not include the 2,800 acres comprising the Plum Brook Depot area. The War Assets Administration accepted custody of the non-depot portion of PBOW (approximately 3,230 acres) in 1946. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts during the 1950s through 1963.

Two property-use agreements were entered into by the National Advisory Committee of Aeronautics, the predecessor of NASA and the Army in 1956 and 1958. On March 15, 1963, accountability for and custody of the entire PBOW property (6,030 acres) was transferred to NASA by the Department of the Army. NASA performed further decontamination during 1964.

The NASA decontamination process was accomplished in five steps (Dames and Moore, Inc. [D&M], 1997a):

1. Inspecting and removing contaminated surface soil above the drain tiles, flumes, etc.
2. Spot checking of subsurface soil in the vicinity of drain tiles, flumes, etc., to determine where the contaminated tiles and flumes were located. Where contamination was found, the flumes, tiles, etc., were removed in sections.
3. Removal of some items previously decontaminated to Level 3X condition to a storage facility and additional decontamination of the remainder of the items to a 5X condition in order to be sold. [The number of "X"s is used in the Army's classification scheme to indicate the level of decontamination: XXX (short hand 3X)-military decontamination level established primarily for worker safety that indicates potentially contaminated material or previously contaminated material that has been decontaminated to a zero residual contamination level; XXXXX (or 5X)– level that indicates a decontaminated material with no detectable residual contamination.]
4. Destruction of all buildings by fire, followed by removal of all debris and concrete foundations. All the materials, including the earth in those areas, were flashed; and the area was then rough graded. Soil investigations at the TNT areas prior to this RI suggest that at least portions of the concrete building foundations remain in place.
5. Decontamination of all sump basins and removal of the concrete.

The decontamination process also included burning of nitroaromatic-filled flumes that were excavated. As shown in the records review (D&M, 1997b) this was performed on July 10, 1963, near the intersection of Fox Road and Snake Road and is suspected to have also occurred at the Additional Burning Ground area.

On April 18, 1978, NASA declared approximately 2,152 acres of land as excess. This excess acreage included former buffer areas that were not formerly used by the Army and were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess for use as a bus transportation center. The General Services Administration retains the remaining acreage and currently has a use agreement with the Ohio National Guard for 604 acres of the land. NASA presently uses the remainder of the former PBOW site to conduct space research as a satellite operation of the John Glenn Research Center based in Cleveland, Ohio. The details of these land transactions are listed in the site management plan (International Consultants Incorporated, 1995) and can be found at NASA PBS.

1.5 Ash Pit Areas

During PBOW operation, three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal storage area, and an above-ground fuel storage tank. The fuel storage tank was surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. The buildings also contained two to four large coal-burning boilers, a turboelectric generator, a feedwater treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the powerhouse was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment (i.e., ash pit) (USACE, 2000).

1.5.1 Ash Pit 1

AP1 is located in the central part of PBOW, approximately 1,095 feet west of the intersection of Maintenance Road and Taylor Road and approximately 50 feet south of Maintenance Road (Figure 1-2). The approximate size of AP1 is 400 feet by 210 feet, comprising nearly 2 acres. During PBOW operation, AP1 received coal ash slurry generated from the boiler in the nearby power station, Powerhouse 1. Most of this powerhouse is now gone, but a portion of the former Powerhouse 1 building is currently being used by NASA. Figure 1-3 shows a historic photograph of AP1 approximately one to two months after PBOW began operation and Figure 1-4 is a historic photograph showing the ash pit, circa 1960.

In June 1999, the USACE Louisville District conducted a Limited Site Investigation (SI) of AP1 to evaluate the potential for contamination that may have resulted from past DOD activities (USACE, 2000). For screening criteria, the SI utilized preliminary remediation goals (PRGs) derived by the U.S. Environmental Protection Agency (EPA); however, the SI did not identify whether they were the 1999 PRGs or those from an earlier PRG listing.

Based on topographical quadrangles (dated 1959 and 1969), aerial photographs, and a visual site survey conducted in 1999, AP1 was noted to be overgrown with thick vegetation and a thicket of small trees ranging from 3 to 8 feet tall. Due to the basically level terrain, AP1 is believed to have been backfilled and graded. Personnel were informed by NASA that an underground, high-

voltage utility line bisected AP1 in a north-south direction and an underground telephone line was present approximately 5 feet south and parallel to Maintenance Road. The USACE also noted a culvert under Maintenance Road and an associated drainage ditch approximately 5 feet due north of AP1. A larger drainage ditch located northwest of AP1 contained water and was flowing in a northeast direction (Shaw, 2009a).

Six surface soil samples (including one field duplicate [FD] sample, one subsurface soil sample, one surface water sample and one sediment sample) were collected from the former AP1 area. Surface soil samples were collected from 0 to 1 foot bgs. Subsurface soil was a composite sample from 1 to 4 feet bgs. Soil samples were collected with a hand auger. Soil samples were analyzed for semivolatile organic compounds (SVOC) and target analyte list (TAL) metals. One surface and one subsurface soil sample were also analyzed for SVOCs, TAL metals, total organic carbon (TOC), and geotechnical parameters (Sieve/Atterberg tests). The surface water and sediment samples were analyzed for SVOCs and Resource Conservation and Recovery Act (RCRA) metals. Figure 1-5 presents the SI sample locations and Table 1-1 presents SI soil sample results. Table 1-2 presents SI surface water and sediment sample results (USACE, 2000).

No SVOCs were detected in any of the soil samples. Arsenic and iron were detected above PRGs derived by the U.S. Environmental Protection Agency (EPA). Arsenic was above PRG limits in all surface soil samples and iron was above screening levels in five of the six samples. Arsenic was detected above the PRG of 0.38 ppm at concentrations ranging from a low of 6.2 ppm in sample SBA101A to 31.2 ppm in sample SSA101. Iron concentrations above the PRG of 22,000 ppm ranged from a low of 24,700 ppm in sample SBA101A-DUP (sample duplicate) to the highest result of 95,100 ppm in sample SBA102A (USACE, 2000).

Arsenic and iron were also detected in the subsurface soil sample SBA103B above the respective PRG. Arsenic concentrations from sample SBA103B were 15.8 ppm and iron was 45,500 ppm. No SVOC compounds were detected in the subsurface soil sample. TOC was measured in the subsurface soil sample at a concentration of 1,900 ppm (USACE, 2000).

No SVOCs were detected in the surface water or sediment sample collected. No metals exceeded PRG concentrations in the surface water sample. Sediment sample SDA101 exhibited arsenic and iron above PRGs. Arsenic was found above the PRG of 0.38 ppm at a concentration of 41.5 ppm and iron was above the PRG of 22,000 ppm at a concentration of 80,900 ppm. Based on the SI results, it was concluded that past DOD activities may possibly have negatively

impacted the environment and the SI recommended additional investigation to further evaluate Ash Pit 1 (USACE, 2000).

1.5.2 Ash Pit 3

AP3 is located approximately 800 feet southwest of the intersection of Maintenance Road and Ransom Road and is west of the former NASA K-Site Test Facility research building (former Powerhouse 3) (Figure 1-2). The size of AP3 is approximately 200 feet by 200 feet, comprising nearly 1 acre. During PBOW operation, AP3 received coal ash slurry generated from the boiler in the nearby power station, Powerhouse 3.

When NASA acquired PBOW property in the 1960s, the power plant facility at Powerhouse 3 was remodeled to become their K-Site Test Facility. In June 1999, the USACE Louisville District conducted a limited SI of AP3 to evaluate the potential for contamination that may have resulted from past DOD activities (USACE, 2000). Based on topographical quadrangles (dated 1959 and 1969), aerial photographs, and a visual site survey the SI noted that AP3 had essentially remained unchanged. At the time of the SI, the K-Site Test Facility was in operation and supplied noncontact cooling water to the former ash pit, to the extent that it held water. The exact depth of the water in the pit is unknown but would not have been greater than a few feet. A pipe at the northeastern corner of the pit had supplied the cooling water. It is possible that this is the original pipe that once supplied the ash slurry to the pit. Boundaries of the pit appear to be the same as the original boundaries, with the exception of an indention to the west on the eastern boundary (USACE, 2000). The K-Site Test Facility is no longer operational, and AP3 is typically no longer ponded.

Operations at the K-Site Test Facility were officially abandoned in 2007; however, the facility may be used for test programs in the future. The discharge pipeline from Powerhouse 3 to the former ash pit is no longer present. Abandoned railroad tracks running in a north-south direction are located immediately east of AP3. The pit is partially surrounded by thick vegetation, with mature and smaller trees. Water was drained from the former pond by means of an east-west-trending ditch that eventually discharges into Pipe Creek (USACE, 2000). Figures 1-6 and 1-7 present historic photographs of the AP3 area, including the associated Powerhouse 3 and the east-west trending drainage ditch, circa 1960.

During the SI, the USACE collected four surface water samples (includes one FD) and three sediment (includes one FD) from three locations. Two of the locations sampled collocated

surface water and sediment sampling while the third location involved only surface water sampling. One surface water/sediment pair was collected near the ash pit slurry entry location, which was also where NASA was releasing non-contact cooling water into the former ash pit. The other sample pair was collected outside the pit in the pit's discharge channel. The single surface water sample was also collected in the discharge channel approximately 100 feet downgradient from the ash pit discharge point (Figure 1-8). Each sample was analyzed for SVOCs and metals. Table 1-2 presents the SI surface water and Table 1-3 presents sediment sample results.

SVOCs were not detected in any of the surface water or sediment samples. No metals were detected above PRG screening levels in any of the surface water samples. A total of 15 metals were detected in the sediment samples, one exceeding the PRG screening limit. Arsenic was detected above the PRG in each of the three samples, exceeding the 0.38 ppm PRG with concentrations ranging from a low of 3.6 ppm to a high of 5.9 ppm. Based on the arsenic concentration exceeding the PRG sediment screening level, the SI recommended further investigation (USACE, 2000) of AP3.

A review of aerial photographs indicates a lack of open water at AP3 in recent history. NASA (2008) personnel communicated that no water was present in AP3 on July 22, 2008. This was also the case during a September 2008 site visit by USACE and Shaw personnel, although a small ponded area was observed after a rain event during an October 2008 site visit.

2.0 Physical Setting

2.1 Geography, Topography, and Surface Drainage

PBOW is located within the Eastern Lake Region of the Central Lowland Province (Soil Conservation Service, 1971). Erie County is overlain by lacustrine sediment, glacial outwash, and glacial till. The surface is generally flat with a slight slope to the north-northeast toward Lake Erie at approximately 25 feet per mile. Elevations at the PBOW range from 680 feet above mean sea level (amsl) at the intersection of Taylor Road and Patrol Road on the southwestern side of the site to 625 feet above msl at the northern portion of the installation. In general, the topography of PBOW is characterized by a flat ground surface with occasional low hummocks caused primarily by glacial scouring and deposition. A low escarpment trends from the western to the northeastern portion of the site (Shaw, 2005).

PBOW lies in the eastern region of the Pickeral Creek-Pipe Creek Basin, which is part of the St. Lawrence River drainage basin (D&M, 1997a). Eleven streams exist within PBOW and flow north-northeast toward Lake Erie, which is located approximately 3.5 miles north of the site. The site is part of four drainage areas: (1) Sawmill Creek (southern PBOW); (2) Plum Brook (central PBOW); (3) Pipe Creek (western PBOW); and (4) Storrs-Hemminger Ditch (north central PBOW), all of which flow into Sandusky Bay (D&M, 1997b). Surface water at AP1 drains from the former ash pit in a western and north-northwest direction into the unnamed drainage ditch. Surface water from AP3 flows distinctly west via a drainage ditch, eventually into Pipe Creek. Overall, surface water drainage of PBOW is controlled by site topography. The streams are incised into bedrock and are poorly developed where they have not yet eroded to the bedrock. Four drainage ditches at PBOW, Lindsley Ditch, Kuebler Ditch, Ransom Brook, and Plum Brook are monitored by NASA PBS under a National Pollutant Discharge Elimination System outfall permit (OEPA, 2007). In addition to the streams, 17 isolated ponds and reservoirs and former red water ponds are located at PBOW (U.S. Geological Survey [USGS], 1992; D&M, 1997b).

2.2 Geology

2.2.1 Regional Geology

The bedrock in northern Ohio consists of Devonian and Silurian carbonates (limestone and dolomite) and clastics (shale, siltstone, and sandstone). These units unconformably overlie older sedimentary sequences of Ordovician and Cambrian Age rocks, which in turn unconformably

overlie pre-Cambrian basement rocks (D&M, 1997a). The local bedrock is situated on the eastern flank of the Findlay Arch. In the Devonian and Silurian of northern and western Erie County, weathering of the carbonates has produced cavernous porosity and karst topography.

2.2.2 Local Geology

At PBOW, three bedrock units are present—the Delaware Limestone, the Olentangy Shale, and the Ohio Shale. The Delaware Limestone is the lowermost formation screened by PBOW site wells. It is characterized as a hard, dense, finely crystalline limestone and dolomite. The unit is typically buff colored, hard, and massive, and is usually described as fossiliferous with pyrite crystals. In the vicinity of PBOW, quarries (Hanson Aggregates to the north, Hanson-Sandusky Crushed Stone to the southwest, and abandoned Castalia quarry to the west) mine limestone from the Delaware. Traces of natural petroleum-derived hydrocarbons and hydrogen sulfide are common in all three quarries. Overlying the Delaware Limestone is the Olentangy Shale. Two members of the Olentangy Shale have been characterized at the site, the Plum Brook Shale and the overlying Prout Limestone. The Plum Brook Shale is interpreted to consist of approximately 35 feet of bluish-gray, soft, fossiliferous shale containing thin layers of dark, hard, fossiliferous limestone. The Prout Limestone has been described as a unit approximately 15 to 50 feet thick, which occasionally outcrops in a 1,000 to 2,000-foot-wide, northeast-striking band across the middle portion of PBOW. It is described as a dark-gray to blue, very hard, siliceous, fossiliferous limestone or dolomitic mudstone. The Olentangy Shale of PBOW dips to the southeast at a slope of approximately 21 feet per mile. The uppermost formation at the site is the Ohio Shale. Geographic Information System data show that the Ohio Shale dips to the southeast at a slope of approximately 26 feet per mile (Shaw, 2005). Only one member of the Ohio Shale is present in the PBOW area, the Huron Shale. This unit is described as black, thinly bedded, with abundant carbonaceous matter. Some large pyrite/carbonate concretions are also present in the Huron Shale, some as large as 6 feet in diameter (D&M, 1997a).

2.2.3 Regional Hydrogeology

Regional groundwater flow is to the north-northeast toward Lake Erie, although local flow may vary due to local topography. Water in the limestone typically occurs in joints and along bedding planes or in solutionally enlarged openings. Although some limestone in the middle of the county provide well yields of up to 500 gallons per minute (gpm), the overburden and the majority of the other formations can sustain groundwater pumping of only 10 gpm or less (D&M, 1997b). A hydrogeological study conducted by USGS on the glacial deposits in

Sandusky in 1990 reported a horizontal hydraulic conductivity of 0.046 feet per day and a vertical hydraulic conductivity of 1.2 feet per day (USGS, 1992).

2.2.4 Local Hydrogeology

From domestic groundwater wells outside PBOW boundaries, the bedrock groundwater is divided into three zones based on location and yield. Zone 1 occurs in the north and northwestern portion of PBOW. It is characterized as yielding from 100 to 500 gpm from karstic limestone approximately 100 feet below grade. Zone 2 is in the northern portion of PBOW and has yields of 15 gpm or less from limestone approximately 300 feet below grade. Zone 3 is located in the eastern and southern portion of the site in predominantly shale bedrock. In addition to being found in the shale, groundwater is located in thin, sand-and-gravel horizons, interbedded with silt and clay deposits. Most Zone 3 wells are poor yielding, many of them providing less than 3 gpm (D&M, 1997a).

Two main water-bearing zones at PBOW are present, one in the overburden/shale and one in the Delaware Limestone bedrock. Data from recent investigations (*2004 Groundwater Data Summary and Evaluation Report* [Shaw, 2005], *2002 Groundwater Data Summary and Evaluation*, [Shaw, 2003], TNT Areas A and C RI [IT, 2000a,b], *Summary Report, Site-Wide Groundwater Monitoring* [1997-1998] [IT, 1999], and the *Site-Wide Groundwater Investigation Report* [IT, 1997a]) have found that groundwater in the overburden is in discontinuous pockets during dry time periods exemplified by monitoring wells that are typically dry or site areas in which wells could not be installed due to a lack of water in the overburden soil at the time of drilling.

2.2.5 Influence of Precipitation on Water Levels

As mentioned in the 2004 Groundwater Data Summary and Evaluation Report (Shaw, 2005), previous investigations have indicated that there is a strong connection between precipitation and groundwater elevations, but no clear correlation exists between monthly precipitation rates and water level elevations in site wells. The lack of observed correlation is probably influenced by the amount of precipitation and the runoff rate. For example, summer thunderstorms that produce short periods of heavy precipitation may result in more surface runoff and less infiltration. Conversely, constant periods of precipitation at a lower rate over a period of days may result in more infiltration. Freezing rain or snow will also not result in an immediate recharge to groundwater. A seasonal correlation was determined from a review of local monthly precipitation data, evapotranspiration and rainfall runoff rates calculations, and a comparison

table of sitewide monitoring well groundwater elevations verses aquifer recharge rates. During the months of January through June, a greater volume of groundwater in the overburden/shale monitoring wells was found to be present, as compared to the months of July through December when a lesser amount of water was found to be present. Therefore, in general, the time period of January through June, when the greatest amount of water in a monitoring well is expected to be present, was given the term “wet” time period, while July through December was given the term “dry” time period.

3.0 Field Activities

3.1 Introduction

Field activities at AP1 and AP3 were in accordance with the updated and revised SWSAP (Shaw, 2008b) and site-specific work plan, as noted in Chapter 1.0. Activities at AP1 included direct-push drilling operations with soil sampling; installation of temporary piezometers within the AP1 site; installation of permanent monitoring wells upgradient, within, and downgradient of the AP1 site; surface water and sediment sampling; two rounds of groundwater sampling (one conducted during the 2009 wet season and the second in the 2009 dry season), and disposal of IDW. At AP3, no soil boring or piezometer drilling could be conducted, due to nearby nesting eagles during geoprobe drilling operations. Field activities at AP3 included only soil (via hand auger), surface water and sediment sampling.

Prior to any intrusive work, a NASA authorized dig permit was obtained for AP1 and AP3. The dig permits included review of utility maps for any underground utilities, including storm water, sewer, electrical, natural gas, telephone, cable, or fiber optic lines. In addition, following Shaw's requirements, a Utility Mark-Out form was completed; and any location to be bored was hand dug for the first 5 feet, verifying no utilities were present. As informed by NASA and determined during the review process, utilities present at AP1 north of the investigation area and south of Maintenance Road include a storm sewer/water conduit at least 6 feet bgs, a buried telephone cable, and an above ground electrical line. Utilities were in a mown grass area. These utilities are parallel to Maintenance Road. A buried electrical line was also indicated perpendicular to Maintenance road running through the ash pit to Powerhouse 1.

At AP3, a large concrete conduit (used to supply emergency fire water to Reservoir No. 2) and a fiber optic line were present at the site. The water conduit line was identified during review of utility maps provided by NASA. The water supply conduit is approximately 30-inches in diameter and is located approximately 40 feet north of AP3 in the wooded area. The depth of the conduit below ground surface is unknown. The fiber optic line is located on the east side of AP3, parallel with and west of adjacent abandoned railroad tracks.

During bedrock monitoring-well installation at AP1, a NASA-authorized burn permit was also obtained each time cutting and welding of steel isolation casing was required.

During marking of boring locations at AP3, it was discovered that a pair of eagles were nested in a tree located near the former ash pit. Following Ohio Department of Natural Resources guidance, no large machines could be within 660 feet of nesting eagles. The initial strategy, which included direct-push drilling for collection of soil samples and installation of temporary piezometers, was re-evaluated in conjunction with the USACE to comply with this state guidance. Because the AP3 area provides excellent habitat for the nesting eagles as well as other wildlife, the general approach to investigation of AP3 was to limit the disturbances in the area. This restricted the activities, such as vegetation clearing and road construction, needed for drill rig access into the site. In addition, potential for even small direct-push rigs to cause damage to the Ash Pit and possibly expose subsurface ash was a concern. The approach taken was to sample the existing surface and subsurface soils with hand augers, collecting data needed to evaluate the presence/absence of contamination as well as potential sourcing to groundwater. This included sampling both the ash layer and soils below the ash layer to determine the types of contamination present in and below the ash layer.

3.2 Direct-Push Soil Sampling/Piezometer Installation

Direct-push drilling was used to collect soil samples and install temporary piezometers at AP1. Twelve soil borings were drilled and six temporary piezometers were installed at AP1. Six soil borings (SB-01 through SB-06) were drilled and sampled to a depth of 10 feet and then backfilled with grout. Two soil borings (SB-08/PZ-05 and SB-09/PZ-06) were drilled and sampled to a depth of 10 feet and then drilling continued until probe refusal. Identification of SB-07 for a soil boring was not used. Upon refusal, 1-inch polyvinyl chloride (PVC) piezometers were installed. The remaining four borings were drilled to refusal and piezometers were installed (PZ-01, PZ-02, PZ-03, and PZ-04). Direct-push drilling activities were conducted by Tri-State Drilling Company of Chattanooga, Tennessee. A track-mounted, Geoprobe 6610 DT drill rig was used at all boring locations on December 8 and December 9, 2008. Figure 3-1 shows locations of direct-push borings and temporary piezometers. Locations of the soil boring/piezometers at AP1 were selected using data and information from the SI report, topography, layout of historic disposal operations, and anticipated overburden/shale groundwater flow directions.

Following PBOW closure and demolition of TNT manufacturing buildings, a fill material (sand) was graded over many PBOW areas, covering remaining foundations and other former ground surface features. During direct push sampling, fill material was encountered in 2 of the 8 soil borings at AP1 to depths of 0.5 foot bgs (SB-01) and 0.8 foot bgs (SB-06). Temporary

piezometer installation encountered fill material at all four locations at depths ranging from 0.6 foot (PZ-01) to 3 feet bgs (PZ-04). Three soil samples were collected from each soil boring from approximate depths of 0 to 1 foot, 3 to 5 feet, and 8 to 10 feet bgs and were analyzed for nitroaromatics, SVOCs, and metals. Also, the 0- to 1-foot and 3- to 5-foot bgs soil samples were analyzed for PCBs, and one surface soil sample (0 to 1 foot interval) was analyzed for TOC.

Continuous lithologic logs were recorded for all soil borings during the drilling. Boreholes in which a piezometer was installed were advanced to refusal, and a 1-inch-diameter PVC screen with 0.010-inch slots (typically 10 feet in length) and 1-inch diameter PVC riser was placed into the 3.25-inch-diameter borehole. No filter pack material or bentonite was used during piezometer construction. To prevent rainwater from entering the borehole from the surface, the piezometer was surrounded with plastic sheeting to a depth of approximately 0.5 foot bgs, cardboard (with a hole in the center) was placed over the piezometer covering the borehole, and bentonite was placed over the cardboard and surrounding surface to a radius of approximately 1 foot. Hazardous, toxic, and radiological waste (HTRW) drilling logs for each borehole, along with the associated temporary piezometer construction diagram, if appropriate, are included in Appendix A. Table 3-1 presents a summary of direct-push soil and groundwater samples collected.

3.3 Direct-Push Groundwater Sampling

As noted in Section 3.2, six temporary piezometers were installed at AP1 (PZ01, PZ02, PZ03, PZ04, SB05/PZ05, and SB06/PZ06). The purpose of the piezometers was to locate potentially contaminated groundwater and determine placement for permanent monitoring well installation. On December 11, 12, and 13, 2009, groundwater from four of the six piezometers were sampled. Groundwater samples from two piezometers, PZ01 and PZ02, were collected using the low-flow sampling method. Groundwater from PZ04 and PZ05 did not recharge sufficiently for low-flow sampling but was sampled after iterative pumping and recharge. Groundwater recharge in piezometers PZ-03 and PZ-06 was so poor that both were pumped dry and no sample was collected. Groundwater from temporary piezometers was sampled using a peristaltic pump. Due to limited groundwater in piezometer PZ04, only nitroaromatics and SVOCs were collected. Besides the sample from PZ04, groundwater samples from the other piezometers were analyzed for nitroaromatics, SVOCs, metals (filtered and unfiltered), hardness, and water quality parameters, including alkalinity, chloride, cyanide, hardness, nitrate, sulfate, total dissolved solids, total suspended solids, turbidity, and ferrous iron. Appendix B contains sample collections logs for the temporary piezometers.

3.4 Monitoring Well Installation

A total of five 2-inch monitoring wells—three overburden/shale (AP1-MW01, AP1-MW02, and AP1-MW03) and two bedrock (AP1-BEDGW-001 and AP1-BEDGW-002)—were installed as part of the RI activities at AP1. Monitoring wells were installed in upgradient, downgradient, and suspected source area locations based upon analytical data from soil and groundwater samples obtained during direct-push soil sampling, temporary piezometer groundwater sampling, February 18, 2009 overburden/shale groundwater flow directions, and 2004 bedrock groundwater flow direction. Note that an existing well (IT-MNTA-BEDGW-001) was suitably placed and was used as the downgradient well for the site. Figure 3-1 shows newly installed monitoring well locations, along with soil boring and temporary piezometer locations at AP1.

No monitoring wells were installed at AP3. As previously noted, the destruction of sensitive ecological habitat necessary for well installation was not deemed acceptable during this phase of the investigation. Further, the presence of utilities (fiber optic and water lines) north and east of the site restricted installation at the more easily accessible areas.

Monitoring wells were installed in accordance with guidelines specified in the USACE Engineering Manual EM-1110-1-4000 (USACE, 1998) and following the procedures in the site-wide SWSAP (Shaw, 2008b). All monitoring wells were completed as described below.

Monitoring well installation was conducted March 15 through March 31, 2009 by A.E. Drilling Services of Greeneville, South Carolina. Prior to drilling, dig permits for direct-push drilling, already in place with NASA, were reviewed to ensure no underground utilities would be encountered during drilling at monitoring-well borehole locations. In addition, the first 5 feet at each borehole location were manually dug with a 4-inch outside diameter (OD) decontaminated, stainless-steel posthole digger to confirm no utilities were overlooked or were not identified by NASA utility location diagrams.

Following posthole digging to 5 feet, overburden/shale boreholes were advanced by a CME-750 drill rig using 8-inch-OD (4.25-inch inside diameter [ID]) hollow-stem augers (HSA) to the depth of auger refusal, except for AP-MW01 and AP-MW03. Monitoring well AP-MW01 was advanced to a depth of 17 feet bgs adjacent to piezometer PZ-04, which was drilled to refusal at 19.6 feet bgs; and well AP1-MW03 was drilled to a total depth of 20 feet bgs adjacent to piezometer PZ-01 advanced to a refusal depth of 19.6 feet. bgs. At most boreholes, soil core

samples were continuously collected from the ground surface to terminating depth using a 2-foot-long and 2-inch-OD stainless-steel split spoon, unless paired with an adjacent bedrock well in which lithologic soil sampling was conducted (AP1-MW02/AP1-BEDGW-002). Soil core samples were visually examined by a Shaw field geologist and documented on HTRW drilling logs. Overburden/shale monitoring well construction logs are included in Appendix A. Well completion in each borehole was accomplished using 2-inch-diameter PVC Schedule 40 riser pipe and a 10-foot Schedule 40, PVC section of 0.010-inch factory slotted screen. No soil samples were submitted to an analytical laboratory, but each sample was screened by a Sirius air quality meter to measure any organic vapors. Construction logs of the monitoring well associated with the appropriate borehole are also included in Appendix A.

For all bedrock wells following posthole digging to 5 feet, a pilot borehole was drilled by a CME-750 drill rig using 4.25-inch-ID by 8-inch OD HSA to bedrock refusal. As with the overburden/shale borehole, soil core samples were continuously collected from the ground surface to terminating depth using a 2-foot-long and 2-inch-OD stainless-steel split spoon. Soil core samples were visually examined by a Shaw field geologist, screened for organic vapors, and documented on HTRW drilling logs (Appendix A).

All bedrock wells were installed as double-cased wells. Therefore, following the pilot borehole drilling, each bedrock well soil borehole was overdrilled with an 8.25-inch-ID by 12-inch-OD HSA until refusal. These augers were temporarily left in place to hold back overburden materials. Following the overdrilling, an 8-inch-OD roller cone bit was used to cut through the weathered bedrock, if present, and cut several feet into the competent bedrock. Roller cone drilling was performed using water for the purpose of both cooling the drill bit and washing rock cuttings from the borehole. The roller cone bit was advanced until at least 3 to 5 feet of competent drilling was completed, which was measured by the competency of cutting pressure, size, and color of rock fragments, and sound of drill bit cutting “chatter.” Upon reaching the appropriate depth, black steel isolation casing (6-inch-ID by 6 5/8-inch-OD) was installed into the borehole and pressure grouted in place.

All pressure grouting was performed using an expendable grout shoe. The grout shoe was a 6 5/8-inch PVC cap placed over the end of the isolation casing before insertion into the borehole. The center of the grout shoe consisted of a one-way valve, similar to the ball valve in a bailer. After the isolation casing and grout shoe were pushed to a depth approximately 2 to 3 inches above the drilled depth, a PVC tremie pipe was connected to the valve. Grout was pumped

through the shoe and into the borehole until freely flowing around the isolation casing at the surface. This method ensured a complete seal of the isolation casing.

After allowing the grout to cure for a minimum of 48 hours, bedrock was then cored with water using a CME-750 drill rig. Coring was conducted through the center of the black steel isolation casing using a custom manufactured PQ bit that collects a 3-inch-OD rock core but drills a 6-inch-OD borehole. All coring was performed using a 5-foot-long core barrel. Rock cores were visually examined and a lithology description was prepared (Appendix A). Photographs of the rock cores were taken and are presented in Appendix C.

It was necessary to use tap water during coring of the bedrock for the purpose of flushing bedrock chips from the borehole, cooling the drill bit, and providing some type of lubrication between the bit and bedrock. After a 5- or 10-foot run was drilled and coring equipment was out of the borehole, water was purged and any recovery rate was measured. If groundwater was interpreted to have been encountered, well completion was accomplished using a 2-inch diameter Schedule 40 PVC riser pipe and 15-foot sections of 0.010-inch continuous wrap screen. Filter packs in screened wells were constructed with sand (tremied), beginning at a depth approximately 1 foot below the screen to approximately 2 feet above the screen. Three to six feet of pellet bentonite were then placed above the sand. The remaining annular space between the PVC riser and the borehole and the PVC riser and the black steel casing was filled (tremied) with bentonite-cement grout from the top of the bentonite to approximately 2 feet bgs.

Each well was completed to minimize frost heave. Beginning at a depth of around 2 feet bgs, bentonite was added within and around the protective casing above the bentonite-cement grout to ground surface. In addition, the concrete for the concrete pad was prevented from touching the protective casing by placing an expendable plastic spacer between the concrete and the protective casing. This was done to allow the concrete pad to move without breaking, in case the ground surface below the pad should heave due to frost. Surface completion at each well consisted of a 4-inch-square, lockable, metal, above-grade protective casing. A 4-foot-square, 4-inch-thick, concrete pad with sides sloping away was constructed around each well. Four protective steel posts were installed at each corner of the concrete pad. An identification plate with the well name, total depth, depth to screen, and survey information was secured to the protective casing.

Monitoring well construction details for the new monitoring wells are summarized in Table 3-3. Drilling logs and well construction diagrams are included in Appendix A.

3.5 Monitoring Well Development

All newly constructed monitoring wells were developed no sooner than 48 hours and no later than 7 days after completion of well construction. A Waterra pump connected with a 1-inch check valve and ½-inch-ID high-density polyethelyene tubing was used to perform well development. The Waterra pump is an inertial pump that requires a 6- to 8-inch surging action for water removal. During development, the check valve and associated tubing were repositioned vertically throughout the screened interval to fully develop the entire well screen. Periodically, development was further enhanced by removing the tubing from the pump and conducting a more aggressive, manual, 1-to-2-foot length surging action. A well-development log was completed for each well to document well development progress, field parameters, and other pertinent information. Photographs of development water and well-development logs are included in Appendix D.

3.6 Piezometer Abandonment

On June 18 and July 6, 2009, all six of the temporary piezometers installed at AP1 for initial investigations purposes were abandoned. Prior to abandonment, the depth to groundwater was measured and recorded. Following measurement of the water level, the piezometer was manually removed from the ground and backfilled with granular bentonite consistent with Ohio regulatory requirements. Approximately 1.25 pounds of bentonite were used in each borehole. Abandonment forms for each piezometer were completed and filed with the Ohio Department of Natural Resources, Division of Water (www.dnr.state.oh.us).

3.7 Groundwater Sampling

Two low-flow groundwater sampling events were completed at AP1 during the PBOW wet and dry seasons. The first sampling event was conducted following well installation during the PBOW wet season of May 2009 and the second during the dry season of November 2009. Groundwater from the monitoring wells was low-flow sampled using a bladder pump. Groundwater samples were analyzed for nitroaromatics, metals (filtered and unfiltered), volatile organic compounds (VOC), SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and oxidation-reduction potential [ORP]).

The potential breathing air quality at a well was assessed prior to purging activities. Upon arrival, the lid to the well was removed, and vapors within the casing were immediately measured using a Sirius air quality meter that measures organic vapors, lower explosion level, carbon dioxide, oxygen, and hydrogen sulfide content. Once well-purging activities commenced, breathing-air concentrations were continuously measured and compared with the health and safety requirements (Shaw, 2008a). Hydrogen sulfide is one of the hazardous chemicals commonly encountered when purging groundwater from the bedrock wells screened within the Delaware Limestone. Hydrogen sulfide readings did not pose a problem at AP1 during either groundwater sampling event.

Three procedures were used for purging and sampling monitoring wells. Low-flow (minimal drawdown) was the preferred purging and sampling method in wells where adequate recharge was present. If a well did not recharge adequately to use the low-flow sampling method (i.e., water level dropped 6 inches or more with a minimum pump rate of 50 milliliters per minute), three volumes of groundwater were removed from above the top of the screen by continued pumping. If, while above the screen, water recharge was so minimal (less than 50 milliliters per minute) that this purging and sampling method could not be conducted in an efficient, timely manner, the water column in the well was removed entirely. Recharged groundwater was sampled the following day.

Samples collected for total dissolved metals analysis were filtered in the field through a 0.45-micrometer, high-capacity filter attached to the discharge line of the bladder pump. If the well was not sampled using the bladder pump (i.e., with a disposable Teflon® bailer), a hand-operated pump with a disposable 0.45-micrometer filter was used.

All groundwater that was removed from the wells during purging activities was containerized and properly disposed of following the IDW management procedures, as identified in the Shaw SWSAP (Shaw, 2008b) and Work Plan (Shaw 2009a). Details of disposal activities are presented in Section 3.12.

Table 3-4 shows a list of the primary groundwater samples collected. Final field measurements were recorded immediately before the water quality meter flow-through cell was disconnected and either prior to groundwater sample collection or, if sampled by a disposable bailer, after the groundwater sample was collected (see Table 3-5). A final water quality reading was not recorded if adequate water volume was not present or if sample water would have possibly

contaminated the recording instrument beyond decontamination efforts due to natural petroleum in groundwater. Monitoring well locations are shown on Figure 3-1. Appendix B contains groundwater sample collection logs.

3.8 Surface Water and Sediment Sampling

Ash Pit 1. Three surface water and sediment samples were collected from the drainage ditch west of AP1, and one surface water and one sediment sample were collected from a low-lying, wet area north of AP1 (Figure 3-1). Surface water and sediment samples were analyzed for nitroaromatics, metals, SVOCs, and PCBs; and one sediment sample was analyzed for TOC. Water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were also recorded for the surface water samples and are shown in Table 3-5. Table 3-6 presents a summary of surface water and sediment samples collected. Appendix B contains surface water and sediment sample collection logs.

Ash Pit 3. Three surface water and three sediment samples were collected from AP3. One surface water and sediment sample were collected near the former ash slurry discharge line, and two other collocated samples were collected from the drainage ditch exiting AP3 located on the southwest side (Figure 3-2). All three collocated surface water/sediment samples were collected near the 1999 SI sample locations. As with the SI analytical, surface water samples were analyzed for nitroaromatics only. Water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were also recorded for the surface water samples and are shown in Table 3-5. One sediment sample, the one collected near the ash slurry discharge pipeline, was analyzed for nitroaromatics, metals, SVOCs, PCBs, and TOC; and the remaining two sediment samples were analyzed for nitroaromatics and PCBs. Table 3-6 presents a summary of surface water and sediment samples collected. Appendix B contains surface water and sediment sample collection logs.

3.9 Ash Pit 3 Soil Sampling

The general investigative approach for AP3 was modified due the nearby nesting bald eagles (refer to Section 3.1). Site walks suggested that excessive damage could occur from even small tracked drill rigs within the AP3 itself due the saturated nature of the soils. The decision was made to complete a less intensive soil sampling approach to evaluate the presence/absence of contamination within the ash layer and potential sourcing to groundwater through collection of soil samples below the ash layer. Hand auger drilling was used to collect soil samples August 19

through August 21, 2009 at AP3. Eight soil borings (SB-01 through SB-08) were drilled to depths ranging from 1.5 to 5 feet bgs. A total of 16 soil samples were collected; typically, 2 samples per borehole (one from the ash layer, if encountered, and one from the clay layer below the ash). Total borehole depth was determined by the top of a clay layer located below the ash. Soil samples were analyzed for nitroaromatics, SVOCs, metals, and PCBs. Soil was collected from the decontaminated, stainless-steel hand auger from the designated interval, placed into a new disposable zip-lock bag, homogenized, and placed into the appropriate sample bottle. Figure 3-2 shows locations of hand augered borings. Locations for the soil borings at AP3 were selected using data and knowledge from the SI report (USACE, 2000), topography, and layout of historic disposal operations. Appendix A contains HTRW drill logs and Appendix B contains soil sample collection logs.

3.10 Decontamination Procedures

Decontamination of drill rigs, downhole tools, and sampling equipment was performed in accordance with Section 5.0 of the SWSAP (Shaw, 2008b). Specifically, drill rigs, rods, drill bits, and augers were cleaned at the decontamination pad using high-pressure hot water from a steam-cleaner. Decontamination was performed before entering the drilling site, between sites, and after completion of the last borehole. Other sampling equipment (hand augers) was decontaminated by rinsing in sequence with phosphate-free soapy water, tap water, methanol, and deionized water. When sampling for PCBs was included in the analysis, a hexane rinse, followed by a deionized water rinse, was also performed. Equipment was then air dried, if possible, before use. The bladder pump used during groundwater sampling was decontaminated by disassembling the pump and decontaminating individual pieces. Disposable tubing and bailers were used in the groundwater sampling; bailers were used where low-flow sampling was not possible. New tubing and a new bailer (as applicable) were used for each well.

3.11 Land Survey

An Ohio-registered professional land surveyor surveyed the locations of the direct-push soil borings, temporary piezometers, overburden/shale wells, bedrock wells, surface water samples, and sediment samples during two mobilizations to AP1. During the first survey event, conducted from January 27 through January 30, 2009, soil borings and piezometers were surveyed. During the second event, conducted from May 18 through May 21, 2009, monitoring wells, surface water, and sediment sampling locations were surveyed at AP1. Horizontal coordinates were surveyed to the closest 0.1 foot and referenced to the Ohio State Plane Coordinate System. Vertical coordinates (land surface and top-of-casing elevation) were surveyed to the nearest

0.01 foot and referenced to the 1929 National Geodetic Vertical Datum. Land survey data reports are included in Appendix E. AP3 surface water, sediment, and soil boring locations were not surveyed because of the nearby nesting eagles. Signs are posted which prohibit any disturbances such as clearing of the heavy tree and brush growth that surveying would necessitate.

3.12 Investigation-Derived Waste Management

IDW generated during investigation activities included soil, groundwater, rock cores, decontamination water, and personal protective equipment. All IDW was managed and handled in accordance with procedures described in the SWSAP (Shaw, 2008b).

Coring fluids, decontamination, development, and purge water generated during field activities were stored in labeled 55-gallon drums. Soil generated during direct-push and monitoring well drilling was collected in 55-gallon drums and labeled with identification of contained material, content volume, date of generation, and source of origin, as applicable. Personal protective equipment (tyvek suits, latex gloves, etc.) and general refuse were double bagged and placed in an on-site, Shaw-contracted industrial dumpster for disposal.

Soil and groundwater IDW was transported to a registered disposal facility following direct-push and monitoring well drilling, groundwater sampling, and analytical determination that the media were nonhazardous. Media which were disposed of include all soil and water generated during monitoring well installation activities and purge and decontamination water generated during groundwater sampling. All fluids and solids were transported by Triad Transport, Inc. to the Environmental Quality Company in Detroit, Michigan, for disposal. All rock cores are currently being stored inside a weather protected, secure NASA bunker.

RI activities at AP1 and AP3 were conducted in sequence and simultaneous with other PBOW investigations. Although identification on the storage drums included contents, date generated, volume, and location of origin, disposal of the drums was based upon weight and area stored. Disposal of soil and liquid occurred in multiple shipments, which included IDW generated from other sites being investigated at the same time. All of the waste manifests generated during the drilling and sampling events are included in Appendix F.

4.0 Analytical Program

The following sections present the analytical program used in this investigation. This review includes the laboratories used for all samples, the analytical methods used, data quality evaluation, and blank analysis. In addition, a description and derivation of risk-based screening criteria (RBSC) is presented in Section 4.2.1. The derivation and use of BSCs and the analytical results are presented in Section 4.2.2.

4.1 Analytical Program and Methodologies

4.1.1 Sample Analysis and Data Validation

Primary and FD project samples collected in December 2009 for AP1 were analyzed by AML Scientific, LLC of Olathe, Kansas. AML Scientific ceased operations at the end of February 2009. Regular and FD project samples collected after February 2009 were analyzed by Accutest Laboratories of Orlando, Florida. Field splits (FS) were analyzed by Test America, Inc., Canton, Ohio. Analysis for nitroaromatic FS samples was performed by Test America of Knoxville, Tennessee, and Test America of Denver, Colorado. All laboratories that analyzed PBOW samples prior to October 1, 2009 were DOD QSM verified and NELAP Certified. All laboratories that analyzed samples for PBOW after October 1, 2009 are compliant with DOD QSM 4.1 and obtained accreditation under the DOD Environmental Laboratory Accreditation Program. Shaw performed the data validation. The validation summaries are provided in Appendix G. The analytical results are summarized in Appendix H. Tables of detected hits that exclude “B” qualified (Section 5.1.3) data are included in Appendix I. A data quality evaluation is located in Appendix J. All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the data reporting requirements of Appendix E in DOD QSM 4.1. The data validation guidelines for performance-based methods established in other DOD guidance on data review and data validation, EPA Nation Functional Guidelines, EPA regional functional guidelines and project-specific guidelines for validation may all have distinct reporting formats. Laboratory reviewed level IV data packages containing all laboratory forms and raw data were provided to the data validators by the laboratory. All analytical data were validated following the U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004a), the QAPP (Shaw,

2008c), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project data quality objectives. The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to National Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993).

4.1.2 Analytical Methods

Chemical analyses for the investigation were performed in accordance with guidelines detailed in EPA's *Test Methods for Evaluating Solid Waste (SW-846), Physical/Chemical Methods,* Third Edition, September 1986 (EPA, 1986) and subsequent revisions. Groundwater, surface water, soil, and sediment samples were collected at AP1 and surface water, sediment, and soil at AP3. The groundwater samples and associated QA/QC samples were analyzed for VOCs, SVOCs, metals, nitroaromatics, and several water quality parameters from AP1. Surface water and sediment samples from AP1 and associated QA/QC samples were analyzed for nitroaromatics, PCBs, SVOCs, metals, and water quality parameters. Surface water from AP3 was analyzed for nitroaromatics only and water quality recordings. All soil samples and associated QA/QC were analyzed for VOCs, SVOCs, metals, and nitroaromatics. Soil samples and associated QA/QC samples from selected depths were also analyzed for PCBs. Most sediment samples and associated QA/QC were analyzed for nitroaromatics, PCBs, SVOCs, and metals, but nitroaromatics and PCBs were only analyzed in two of the three samples at AP3 because PCBs were analyzed in a sample from this location during the SI. TOC was also measured in selected samples from both locations. Methods used for analysis for all four media are summarized in Table 4-1.

4.1.3 Data Quality Evaluation

The reliability of the sampling and analytical procedures used during the investigation was demonstrated by implementing the project-specific quality assurance procedures specified in the SWSAP (Shaw, 2008b) and QAPP (Shaw, 2008c) and its site-specific attachments. Successful execution of these procedures provides strong supporting evidence that the data are representative of the areas under investigation.

The data quality objectives (DQO) for this project were to produce scientifically valid data of known accuracy and precision that were complete with respect to identified critical samples,

comparable with similar data types, and representative of the media sampled so as to be useful for the cited purposes. Evaluation of the data using the DQOs and the data validation process resulted in the determination that most of the data set is valid and of sufficient quality to meet the objectives of the investigation. The instrument calibration responses for acrolein (not a compound of interest), 2-butanone, and acetone were below method criteria. Acetone and 2-butanone are both “poor” performers by SW-846 8260. 2-Butanone and acetone results reported by the laboratory as non-detect were rejected (qualified “R”) by the data validators due to poor instrument response. Acetone and 2-butanone results reported by the laboratory as detects were qualified as estimated “J.” A complete evaluation of the analytical results is given in the data quality evaluation found in Appendix J.

4.1.4 Blank Evaluation

The purpose of blank analysis is to detect contamination resulting from laboratory and field activities. Blank evaluation involves qualification of data based on the results of associated field blanks, trip blanks, equipment rinsates, and laboratory method blanks. The criteria for blank evaluation are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is greater than the contract-required quantitation limit, but is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified “B.”
- For organics, if the sample result is less than the contract-required quantitation limit and less than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, the sample result is qualified "B." The "J" qualifier is not used.
- For metals, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."
- If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, the sample result is not qualified.

In instances where more than one blank is associated with a given sample, qualification is based upon a comparison with the associated blank having the highest concentration of a contaminant. Blank results are not subtracted from sample concentrations. Note that data with “B” validation qualifiers are included in the Chapter 5.0 tables, but the associated concentrations are not included in the tables’ “maximum detected concentration” (MDC) column because “B” qualified data are not used in PBOW risk assessments.

4.1.5 Field Duplicate and Field Split Evaluation

Field duplicates were taken at a frequency of 1 field duplicate per every 10 samples collected. All media sampled have at least one field duplicate collected. Field duplicates are defined as samples collected at a single sampling location during multiple acts of sampling, that equally represent a medium at a given time and location. The data generated from the analysis of field duplicate samples were used to evaluate the precession of the sample collection and analysis procedures. A complete evaluation of the field duplicate results is given in the data quality evaluation found in Appendix J.

Field splits were collected in conjunction with field duplicate and were sent to a different laboratory than the primary contract laboratory. In this case, the field splits were submitted to Test America, North Canton, Ohio. The field split samples were submitted to the split laboratory for the same analysis as their corresponding field duplicate and original parent sample. The split samples were used to determine reproducibility of the analytical results when analyzed by different laboratories. Split sample results were also used to ensure the contract laboratory's preparation and analysis procedures were in control and met the approved method criteria. A complete evaluation of the field split results is given in the data quality evaluation found in Appendix J.

4.2 Comparison to Screening Criteria

The analytical result tables presented in Chapter 5.0 include a comparison to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in the tables. RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks will be performed in the BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified as bolded in the Chapter 5.0 result tables.

4.2.1 Risk-Based Screening Concentrations

The RBSCs are derived from EPA (2010) regional screening levels (RSL) as described in the AP1 and AP3 BHHRA work plan (Shaw, 2009b). The groundwater RBSCs are based on a generalized residential drinking water scenario, assumed to be the most restrictive use of groundwater, and they correspond to a one-in-a-million (1E-6) incremental lifetime cancer risk (ILCR) or a noncancer hazard quotient of 0.1, whichever results in a lower concentration (Shaw,

2009b). The soil RBSCs are based on a long-term residential land-use scenario that assumes use by a young child for noncancer effects and use by the combined young child and adult life stages for carcinogenic effects. Together, these capture a worst plausible case for future land use. The soil RBSCs are likewise based on an ILCR of 1E-6 and a hazard quotient of 0.1. Although no RSLs exist for surface water or sediment, the tap water and residential soil regional RSLs are used directly as the RBSCs for surface water and sediment, based on a Project Delivery Team agreement (Ohio Environmental Protection Agency, 1999) which used the former Region 9 preliminary remediation goals (EPA, 2004b) for this purpose. The method has been updated to use RSLs rather than preliminary remediation goals (Shaw, 2010). As stated in Section 4.2, laboratory analytical results are compared to RBSCs only as a point of reference. Further details on the RBSCs and their derivation will be provided in the BHHRA.

4.2.2 Background Screening Concentrations

BSCs have been derived for metal analytes and benzene, toluene, ethylbenzene, and xylenes in groundwater (Shaw, 2005) and for metals in PBOW soils (IT, 1998). Table 4-2 presents a complete list of background screening values generated for groundwater while Table 4-3 presents a complete list for metals in soil. The BSCs were derived from concentrations of these analytes found in PBOW background groundwater monitoring wells and soil data sets. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower, for each relevant analyte (IT, 1998; Shaw, 2005). The background monitoring well samples were collected using low-flow methodology and were not filtered.

5.0 Investigation Results

5.1 Local Physical Setting

5.1.1 AP1 Site-Specific Soils

At many PBOW sites, following closure and removal of the manufacturing structures, tanks, and equipment, a local fill sand was brought to the areas to cover the remaining concrete building foundations and demolition scars and to provide a level ground surface to promote a natural landscape. At AP1, fill material was encountered in 10 of the 17 soil borings drilled within and near the former ash pit. At boring locations that did not encounter fill material, black ash and cinders were visible on the ground surface. Fill material at most borings consisted of a black organic to dark yellowish-brown sand with little to a trace of silt. Within the former ash pit, fill material was believed to have been encountered in only two borings, SB-01 and SB-06. At borings for monitoring wells AP1-MW02 and AP1-BEDGW-002 installed within the former ash pit, the 1940 ground surface was interpreted to have been encountered at a depth of 4 feet bgs. Fill material consisted of an organic, yellowish brown, high plasticity, silty clay overlying native soil consisting of brown, mottled, clayey silt. At six of the borings within the ash pit, no fill material was encountered; and a black, fine grain, cinder-ash mixture was recovered from the existing ground surface. Figure 5-1 shows an AP1 site map with soil boring locations, and Appendix A presents HTRW soil boring drill logs.

On average, soil borings drilled within the former ash pit (SB-01 through SB-06, SB-08/PZ-05, and SB-09/PZ-06, and monitoring well borings AP1-MW02/AP1-BEDGW-002) encountered native soil at a depth of approximately 1 foot bgs. Below the ash layer, native soil consisted of a glacial till, glacial outwash, or a glacial lacustrine (lake) deposit. In general, a loose, mottled, very fine grain, brownish colored sand on the western side of the ash pit and a soft, grayish colored silt in the central and eastern side was first encountered. Below the sand-silt, a stiff, low plasticity, silty clay was encountered that continued to the top of bedrock (Olentangy Shale), typically encountered at a depth of 20 feet bgs.

5.1.2 AP3 Site-Specific Soils

No fill material, or soil purposely placed for leveling and landscape appearance, was believed to have been encountered during hand augering of the eight soil borings within former AP3. Ash was encountered in six of the eight borings at an average depth of 0.4 feet bgs. Material above the ash was either an organic matter (roots, decaying leaves and sticks) or natural soil (black,

silty sand) washed into place. The ash layer encountered averaged approximately 1 foot in thickness and typically consisted of a black, fine-to-medium grain, sand-ash mixture. Below the ash layer, a gray, mottled, silty clay or clayey silt was encountered. The depth of the soil borings hand augered at AP3 ranged from 1.5 to 5 feet bgs. Bedrock was not encountered in any boring. Figure 5-2 shows an AP3 site map with soil boring locations and Appendix A presents HTRW soil boring drill logs.

5.1.3 AP1 Site-Specific Geology

Bedrock units encountered at AP1 are of Devonian age and consist of the Olentangy Shale and the underlying Delaware Limestone. Figure 5-3 presents a regional geological map. Six piezometers advanced to refusal are believed to have encountered the Olentangy Shale at depths ranging from 18 to 19.6 feet bgs, but could not be confirmed because no refusal material was recovered. Monitoring wells AP1-MW02, AP1-BEDGW-001, and AP1-BEDGW-002 encountered the shale at depths of 20.5, 25.5, and 21.4 feet bgs, respectively, or elevations of 623.2, 616.3, and 613.1 feet amsl, respectively. The Delaware Limestone was encountered in well AP1-BEDGW-001 at a depth of 44.6 feet (597.20 feet amsl) and in well AP1-BEDGW-002 at a depth of 39.5 feet (595 feet amsl).

The Olentangy Shale at AP1 was not encountered in borings AP1-MW01 and AP1-MW03, completed for the overburden/shale wells, because they were not advanced to refusal. As determined by rock core recovery during borehole drilling for bedrock monitoring wells AP1-BEDGW-001 and AP1-BEDGW-002, the Olentangy Shale at AP1 is typically gray to dark gray in color, highly weathered near the soil bedrock interface, thinly laminated, and friable. Competency of the shale increased with depth. The Delaware Limestone below the shale was typically found to be dark gray in color, hard, slightly weathered, and fossiliferous (brachiopods, corals, styolites), and to exhibit massive bedding. Pyrite crystals were found on several cores. In addition, during drilling for monitoring well AP1-BEDGW-001 at around 57, 62, and 66 feet bgs, petroleum hydrocarbon was found seeping from the rock core. This is believed to be a natural petroleum common in the Delaware Limestone of the region. Table 5-1 lists information relative to PBOW bedrock monitoring well borings from 1941 through 2009, which encountered natural petroleum hydrocarbon vapors, rock core staining, or hydrogen sulfide vapors.

5.1.4 AP3 Site-Specific Geology

As explained previously, no overburden/shale or bedrock monitoring wells were installed at AP3.

5.1.5 AP1 Site-Specific Hydrogeology

Overburden/shale groundwater at AP1 was encountered at depths ranging from 4 feet (PZ04, SB-02, SB-04, and SB-05) to 10.4 feet bgs (PZ02) in December 2008 (dry season) during soil boring drilling/piezometer installation. During monitoring well installation conducted in March 2009 (wet season), overburden/shale groundwater was encountered at the shallow depth of 1 foot in two of the five monitoring wells, while the deepest depth was only 2.2 feet (AP1-MW01). Due to a medium to very stiff clay preventing the detection of groundwater, the depth at which groundwater was encountered in well AP1-MW03 is unknown. Table 5-2 shows water level elevations at piezometers and monitoring wells. As shown by the May 26, 2009, overburden/shale groundwater elevation contour map (Figure 5-4), which includes water-level measurements from both the temporary piezometers and permanent monitoring wells, including the nearby Locomotive Building Area and Rail Car Washing Area wells, groundwater flow is in a northwest and west direction toward an unnamed drainage ditch. Figure 5-5 presents an overburden/shale groundwater potentiometric map of water level measurements taken October 27, 2009 (dry season) from the overburden/shale monitoring wells (the piezometers were abandoned in July 2009). The groundwater flow direction during October 2009 is also in a northwest-west direction. Overburden/shale groundwater flow mimics the surface topography from both contour maps.

Two bedrock monitoring wells were installed at AP1. Well AP1-BEDGW-001 was installed in an upgradient position, south of the ash pit; and bedrock well AP1-BEDGW-002 was a source well installed within the ash pit on the north central edge. Existing well IT-MNTA-BEDGW-001 was used as a downgradient well. Bedrock groundwater was encountered during March 2009 drilling of these wells in fractures at depths of 68 feet (AP1-BEDGW-001) and 51.3 feet (AP1-BEDGW-002). The screened interval of each of these wells is within the Delaware Limestone bedrock. Groundwater level measurements collected from these two bedrock wells, combined with other nearby bedrock wells from the Locomotive Building Area and Waste Water Treatment Plant 1, determined the direction of bedrock groundwater flow to be in a northwest direction. Figures 5-6 and 5-7 show the regional groundwater flow to be in a northwest direction toward a groundwater low, which bisects PBOW in a southwest to northeast direction.

5.1.6 AP3 Site-Specific Hydrogeology

During August 2009 (dry season) soil boring drilling, overburden/shale groundwater at AP3 was encountered in six of the eight borings at depths ranging from 1 foot (SB-05, SB-07, and SB-08)

to 2 feet bgs (SB-06). No overburden/shale or bedrock monitoring wells are installed at the AP3 area, so current site-specific information is not available; however, site-wide bedrock groundwater information suggests bedrock groundwater flows to the southeast in the AP3 area (Shaw, 2005).

5.1.7 AP1 Site-Specific Hydraulic Connection Between Zones

Vertical hydraulic gradients (Table 5-3) were calculated for paired wells AP1-MW02 and AP1-BEDGW-002, located near the northwest side of AP1. These wells are the only paired wells at the AP1 site. Overburden well AP1-MW02 is screened within overburden material, and bedrock well AP1-BEDGW-002 is screened within the Delaware Limestone. Groundwater elevations in the overburden/shale well are higher than those in the bedrock well for all water levels measured under this investigation. This difference suggests that there may be relatively limited connectivity between the overburden and bedrock water-bearing zones at AP1. In addition, any vertical groundwater migration that occurs will be downward from the overburden into the bedrock. The vertical gradient (0.953 ft/ft) at this well pair was compared with the vertical gradient at other PBOW well pairs (Table 5-3). The comparison shows similar results in that the AP1 wells have a downward vertical gradient, implying the potential for downward groundwater migration from the overburden/shale water-bearing zone to the bedrock aquifer.

5.1.8 AP3 Site-Specific Hydraulic Connection Between Zones

No monitoring wells were installed or are present at the AP3 area, so site-specific hydrology information is not available.

5.2 Soil Results

5.2.1 AP1 Soil

On December 8 and December 9, 2008, 12 borings were drilled within the former ash pit; eight from which soil samples were collected and four that were used only for temporary piezometer installation (Figure 5-1). Six soil borings (SB-01 through SB-06) were drilled to a depth of 10 feet and soil samples were collected. Two soil borings (SB-08/PZ-05 and SB-09/PZ-06) were drilled to a depth of 10 feet, soil samples were collected, and the drilling continued until probe refusal.

A total of 30 soil samples were collected from the 8 sampled borings. Ten surface soil samples (including one FD and one FS) and 20 subsurface soil samples (including two FDs and two FSs)

were collected from six soil boring locations (SB-01 through SB-06) and two piezometer locations (SB-08/PZ-05 and SB-09/PZ-06). Table 5-4 summarizes the soil concentrations above the RBSC and/or BSC. Figure 5-8 shows soil sample locations, along with corresponding analytical results above the RBSC and/or BSC.

5.2.1.1 2008 AP1 Surface Soil Samples

No nitroaromatics were detected and no PCBs were detected above RBSCs in the surface soil samples at AP1. Four SVOCs were detected in three surface soil samples (includes FD and FS samples) from one boring (SB-08) above RBSCs. Compounds included benzo(a)anthracene (0.58 to 1.02 ppm), benzo(a)pyrene (0.55 to 0.839 ppm), benzo(b)fluoranthene (0.77 to 1.34 ppm), and indeno(1,2,3-cd)pyrene (1.95 and 1.68 pm). The RBSCs for these compounds are all 0.15 ppm.

Six metals (aluminum, arsenic, chromium, cobalt, iron, and manganese) were detected above RBSCs in nearly all of the 10 surface soil samples. Aluminum concentrations above the RBSC were detected in seven samples and ranged from 7,910 ppm (boring SB-08; 0 to 1 foot) to a maximum of 12,700 ppm in boring SB-04 (0 to 1 foot). Arsenic concentrations above the RBSC of 0.39 ppm were detected in all surface soil samples. Concentrations ranged from 6.7 ppm in the sample from boring SB-01 (0.5 to 1.5 feet) to 13.2 ppm in SB-03 (0 to 1 foot). Chromium, cobalt, iron, and manganese were detected above the RBSCs in all soil samples from all borings. Concentrations of chromium above the RBSC of 0.29 ppm ranged from 10.6 ppm (SB-01) to 16.4 ppm in boring SB-05. Cobalt samples above the RBSC of 2.3 ppm ranged from a low of 5.47 ppm (SB-01) to a high concentration of 9.92 ppm (SB-03). Concentrations of iron in the surface soil above the RBSC of 5,500 ppm ranged from 17,200 ppm (SB-01; 0.5 to 1.5 feet) to 90,300 ppm in the sample from boring SB-04 (0 to 1 foot). Manganese concentrations above the RBSC of 180 ppm ranged from 241 ppm (SB-04; 0.0 to 1.0 foot) to 2,810 ppm (SB-09; 0 to 1 foot). In addition, beryllium was detected above the 16 ppm RBSC in only one boring, SB-04 (0 to 1 foot) at a concentration of 16.5 ppm.

Two metals, beryllium and mercury, were above BSC values. Beryllium was the only metal in surface soil to exceed both the RBSC and BSC. Beryllium was above the BSC in eight of the nine samples and mercury exceeded the BSC in five of the nine samples. Concentrations of beryllium that exceeded the BSC of 1 ppm ranged from a low of 5.74 ppm (SB-01) to 16.5 ppm (SB-04). Mercury concentrations above the BSC of 0.09 ppm ranged from 0.0928 ppm in SB-03 to 0.383 ppm in SB-04. TOC was 55.3 ppm in the surface soil sample at boring SB-01.

5.2.1.2 2008 AP1 Subsurface Soil Samples

No nitroaromatic or PCB compounds were detected in the subsurface soil samples at AP1. A total of nine SVOCs were detected in the subsurface soil samples. From these nine compounds, only benzo(a)anthracene and indeno(1,2,3-cd)pyrene were above RBSC values. Benzo(a)anthracene was detected at a concentration of 0.0534 ppm, and indeno(1,2,3-cd)pyrene was detected at a concentration of 0.312 ppm. Both results were from boring SB-08 at a depth of 3 to 5 feet.

A total of 22 metals were detected in subsurface soil samples from AP1, seven above RBSC values and three above the BSC. Metals above RBSC values include aluminum, arsenic, cadmium, chromium, cobalt, iron, and manganese. Concentrations of aluminum above the RBSC of 7,700 ppm were detected in 13 of the 20 samples. Concentrations ranged from 7,780 ppm in soil boring SB-02 (8 to 10 feet) to 13,000 ppm in SB-06 (5 to 5.8 feet). Concentrations of arsenic above the RBSC of 0.39 ppm were detected in all of the soil borings. Arsenic concentrations ranged from 3.42 ppm in boring SB-04 (3 to 4 feet) to 11.6 ppm in boring SB-05 (3 to 3.7 feet). Cadmium was detected above the 7 ppm RBSC at a concentration of 7.66, only in the soil sample from boring SB-06 (8 to 10 feet). Chromium, iron, cobalt, and manganese were detected above RBSCs in all subsurface soil samples. Concentrations of chromium above the RBSC of 0.29 ppm ranged from 5.51 ppm (SB-03; 3 to 5 feet) to a high of 19.5 ppm (SB-06; 5 to 5.8 feet). Cobalt concentrations above the RBSC of 2.3 ppm ranged from 3.23 ppm in SB-03 (3 to 5 feet) to 62.2 ppm in SB-04 (8 to 10 feet). Iron was detected above the RBSC of 5,500 ppm at concentrations ranging from 10,600 ppm in SB-03 (3 to 5 feet) to 62,000 ppm in SB-05 (3 to 3.7 feet). Manganese was detected above the RBSC of 180 ppm in all samples, with concentrations ranging from 251 ppm in SB-01 (3.5 to 5.5 feet) to 4,470 ppm in SB-04 (8 to 10 feet). Three metals exceeded BSC values, beryllium, magnesium, and manganese. Beryllium concentrations exceeded the 1 ppm BSC in 17 of the 20 subsurface soil samples. Results ranged from 3.62 ppm at boring SB-03 (3 to 5 feet) to 12.9 ppm at boring SB-05 (3 to 3.7 feet). The BSC for magnesium was exceeded in 12 of the 20 soil samples collected, but since magnesium is an essential human macronutient, further discussion is not warranted. The BSC for manganese (3,506 ppm) was exceeded only in soil from boring SB-04 (8 to 10 feet) at a concentration of 4,470 ppm. Manganese was also the only compound to exceed both the RBSC and BSC.

5.2.2 AP3 Soil

On August 19 through August 21, 2009, eight borings (SB-01 through SB-08) were hand augered within the former ash pit (Figure 5-2). Each boring was drilled until a confining clay/silt layer was encountered below the ash layer. Total depths ranged from 1.5 feet bgs (SB-04) to 5 feet bgs (SB-05). A total of 20 soil samples were collected from material within an ash layer and below an ash layer. Ten surface soil samples (including one FD and one FS) and 10 subsurface soil samples (including one FD and one FS) were collected. No temporary piezometers or monitoring wells were installed within the soil boreholes. Due to the shallow depth of each boring, each boring was backfilled with cuttings. Table 5-4 summarizes the soil concentrations above the RBSC and/or BSC. Figure 5-8 shows soil sample locations, along with corresponding analytical results above the RBSC and/or BSC.

5.2.2.1 2009 AP3 Surface Soil Samples

One nitroaromatic was detected (2,6-dinitrotoluene [2,6-DNT]) in four surface soil samples, but all detections were below the 0.71 ppm RBSC. One PCB compound (Aroclor 1260) was detected in two soil samples but each was below the RBSC. A total of 11 SVOCs were detected, all in the surface soil sample from boring SB-01, three of which were above RBSCs. SVOCs included benzo(a)anthracene above the 0.15 ppm RBSC at a concentration of 0.156 ppm, benzo(a)pyrene above the 0.015 ppm RBSC at a concentration of 0.168 ppm, and benzo(b)fluoranthene above the RBSC of 0.15 ppm at a concentration of 0.268 ppm.

Twenty-two metals were detected in the surface soil at AP3, and six exceeded their associated RBSC. Metals above the RBSC in nearly every sample included aluminum, arsenic, chromium, cobalt, iron, and manganese. Aluminum concentrations above the RBSC, detected in six of the ten samples, ranged from 8,820 ppm in boring SB-03 (0.2 to 1.7 feet) to a maximum of 10,400 ppm in the FD sample from boring SB-08 (0.3 to 1 foot). Arsenic concentrations above the RBSC of 0.39 ppm were detected in all surface soil samples. Concentrations ranged from 4.9 ppm in the sample from boring SB-02 (0 to 1 foot) to 60.8 ppm in the FD sample from SB-08 (0 to 1 foot). Chromium and iron were detected above the RBSCs in all soil samples from all borings. Concentrations of chromium above the RBSC of 0.29 ppm ranged from 6.9 ppm (SB-07) to 18.8 ppm in boring SB-08 (FD). Concentrations of iron in the surface soil above the RBSC of 5,500 ppm ranged from 12,400 ppm (SB-01) to 68,300 ppm in the sample from boring SB-06 (0.2 to 1 foot). Cobalt was detected above the RBSC of 2.3 ppm in all borings and in all but the FS sample. Concentrations ranged from a low of 4.5 ppm in samples SB-01 and SB-06 to

a high concentration of 8.9 ppm (SB-04). Manganese was above the RBSC of 180 ppm in seven samples, at concentrations ranging from 217 ppm in boring SB-07 to 353 ppm in boring SB-02.

Arsenic, beryllium, copper, mercury, selenium, and thallium were above BSC values. Arsenic was detected above the 36.5 ppm BSC at a concentration of 60.8 ppm, only in the FD surface soil sample from boring SB-08. This was also the only sample to exceed both the RBSC and BSC. Beryllium was detected in five of the ten samples above the RBSC of 1 ppm at concentrations ranging from 1.5 ppm in SB-05 to 2.1 ppm in SB-04. Copper was detected in only one sample above the BSC of 56.2 ppm at a concentration of 124 ppm in the surface soil sample from boring SB-01. Mercury was detected in two soil samples above the 0.09 ppm BSC at concentrations of 0.15 ppm in SB-01 and 0.13 ppm in SB-04. Selenium was above the BSC of 2 ppm in four samples, with concentrations ranging from 2.2 ppm in the regular surface soil sample from boring SB-08 and 3.3 ppm in the FD sample from the same boring. Thallium exhibited only one concentration that was above the BSC of 1.3 ppm. This was found in the surface soil from boring SB-06. No surface soil samples from AP3 were analyzed for TOC.

5.2.2.2 2009 AP3 Subsurface Soil Samples

One nitroaromatic, 2,6-DNT, was detected in the subsurface soil from AP3 but was below the RBSC. No SVOCs or PCBs were detected in the subsurface soil samples at AP3.

A total of 22 metals were detected in subsurface soil samples from AP3, six above RBSC values and three above the BSC. Metals above RBSC values include aluminum, arsenic, chromium, cobalt, iron, and manganese. Concentrations of aluminum above the RBSC of 7,700 ppm were detected in eight of the 11 samples. Concentrations ranged from 7,840 ppm in soil boring SB-06 (2 to 2.7 feet) to 11,400 ppm in SB-06 (1 to 2 feet). Concentrations of arsenic above the RBSC of 0.39 ppm were detected in all of the soil borings. Arsenic concentrations ranged from 5 ppm in boring SB-01 (3 to 5 feet) to 32.7 ppm in boring SB-08 (1-2 feet). Chromium, cobalt, and iron were detected above RBSCs in all subsurface soil samples. Concentrations of chromium above the RBSC of 0.29 ppm ranged from 7.7 ppm (SB-04; 0.8 to 1.5 feet) to a high of 15.4 ppm (SB-03; 3 to 5 feet). Cobalt concentrations above the RBSC of 2.3 ppm ranged from 5.9 ppm in SB-04 (0.8 to 1.5 feet) to 12.2 ppm in SB-08 (1 to 2 feet). Iron was detected above the RBSC of 2,300 ppm at concentrations ranging from 11,200 ppm in SB-04 (0.8 to 1.5 feet) to 67,800 ppm in SB-05 (1 to 2 feet). Manganese was detected above the RBSC of 180 ppm in 9 of the 11 samples, with concentrations ranging from 188 ppm in SB-03 (3 to 5 feet) to 1,270 ppm in SB-08 (1 to 2 feet).

Five metals—beryllium, calcium, magnesium, selenium, and thallium— exceeded BSC values. Beryllium concentrations exceeded the 1 ppm BSC in only 2 of the 11 subsurface soil samples. Results were 1.5 ppm in the sample from boring SB-02 (1.2 to 2.3 feet) and 1.9 ppm in soil at boring SB-03 (3 to 5 feet). The BSC for calcium was also exceeded from only two soil samples. Concentrations were 52,800 ppm in SB-05 (1 to 2 feet) and 54,300 ppm in soil from the FS sample from boring SB-07 (1 to 2 feet). Magnesium BSC values were exceeded by concentrations in eight samples; but since it is an essential human macronutrient, further discussion is not warranted. Selenium was detected above the BSC in three samples, with concentrations ranging from 2.1ppm in SB-06 (2 to 2.7 feet) to 2.7 ppm in soil from boring SB-03 (3 to 5 feet). Detections of thallium above the BSC of 1.3 ppm were shown in soil results from two samples, 2.7 ppm in soil from the FS sample from SB-07 (3 to 5 feet) and 2.9 ppm from boring SB-06 (1 to 2 feet).

5.3 Surface Water Results

5.3.1 AP1 Surface Water

On May 19 and May 20, 2009, three surface water samples were collected from the unnamed tributary located west of AP1; and one sample was collected from a low-lying, wet area within the northern portion of AP1. Surface water samples were analyzed for nitroaromatics, metals, SVOCs, and PCBs. Water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were also recorded and are shown in Table 3-5. Sample collection began at the farthest downstream location and continued in the upstream direction. Table 5-5 presents detected constituents above RBSC values in surface water samples. Figure 5-10 presents surface water sample locations, along with corresponding analytical results above RBSCs.

2009 AP1 Surface Water Analytical Results. No nitroaromatics, SVOCs, or PCBs were detected in any surface water samples. A total of 16 metals were detected from the combined four surface water samples, but only in one sample, AP1-SW04, were metals detected above RBSCs (arsenic, chromium, and lead). Arsenic was detected at a concentration of 8.3 parts per billion (ppb), above the RBSC of 0.45 ppb; chromium was detected at a concentration of 13.9 ppb, above the RBSC of 0.43 ppb; and lead was detected at a concentration of 15 ppb, equal to the RBSC of 15 ppb.

5.3.2 AP3 Surface Water

Three surface water samples were collected from AP3 on May 23 and May 27, 2009. One surface water sample was collected near the former ash-slurry discharge line and two were collected from the drainage ditch exiting AP3 on the southwest side. Each sample was collected at or near the 1999 SI sample collection location and was analyzed for nitroaromatics only. Water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature) were also recorded for the surface water samples and are shown in Table 3-5.

2009 AP3 Surface Water Analytical Results. No nitroaromatics were detected in any of the surface water samples, hence no analytical data for AP3 surface water samples is shown in a table other than the water quality readings presented in Table 3-5.

5.4 Sediment Results

5.4.1 AP1 Sediment

Three sediment samples were collected from the unnamed drainage ditch located west of AP1, Collocated with the surface water samples, and one sediment sample was collocated with the surface water sample from the low-lying, wet area located in the northern portion of AP1. Like the surface water samples, the sediments were collected May 19 and May 20, 2009. Sediment samples were analyzed for nitroaromatics, SVOCs, metals, and PCBs. Two samples, AP1-SD01 and AP1-SD04, were also analyzed for TOC. Table 5-6 presents detected constituents in sediment samples above RBSCs, and Figure 5-10 presents sample locations, along with corresponding analytical results above RBSCs.

2009 AP1 Sediment Analytical Results. No nitroaromatics were detected in any of the sediment samples. A total of 11 SVOCs were detected, but all were below associated RBSCs, and 10 of the compounds were found only in sample AP1-SD04. Two PCBs, Aroclor 1254 and Aroclor 1260, were detected in two samples; but each were also below RBSC levels. Two of the SVOCs, benzo(a)pyrene (0.112 ppm) and benzo(b)fluoranthene (0.175 ppm), exceeded the respective RBSCs (0.015 and 0.15 ppm), and both of these exceedances were in sample AP1-SD04. This sample was collected from an area within AP1 in which water associated with precipitation events may collect. This area does not represent an aquatic environment, and this sample is thus likely analogous to surface soil. None of the PCBs were detected at concentrations exceeding the RBSCs. A total of 18 metals, excluding 4 detected essential human macronutrients, were detected in the 4 sediment samples. Metal analytes detected included

aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc. Most of the metals were found in each of the sediment samples collected. The only metals above RBSC values were arsenic and chromium. Arsenic was detected above the RBSC of 3.9 ppm in each sample collected. Concentrations ranged from a low of 4 ppm in sample AP1-SD03 to a high of 15.9 ppm in sample AP1-SD04. Chromium was found above the RBSC value of 2.9 ppm in each sample, with concentrations ranging from a low of 7.8 ppm in AP1-SD03 to 16.9 ppm in sample AP1-SD01. TOC was measured in sediment samples AP1-SD01 at a concentration of 21,000 ppm and AP1-SD04 at a concentration of 43,000 ppm.

5.4.2 AP3 Sediment

Collocated with the surface water samples, three sediment samples were collected at AP3 on May 23 and 27, 2009. Sediment sample AP3-SD01 was analyzed for nitroaromatics, SVOCs, PCBs, metals, and TOC and sediment samples AP3-SD02 and AP3-SD03 were analyzed for only nitroaromatics and PCBs. Table 5-6 presents detected constituents in sediment samples above RBSCs and Figure 5-11 presents sample locations along with corresponding analytical results above RBSCs.

2009 AP3 Sediment Analytical Results. No nitroaromatics or PCBs were detected in any of the three sediment samples. Nine SVOCs were detected in the only AP3 sediment sample analyzed for SVOCs, AP3-SD01, but only two, benzo(a)pyrene and benzo(b)fluorathene, exceeded the RBSCs. Benzo(a)pyrene was detected at a concentration of 0.158 ppm above the RBSC of 0.015 ppm, and benzo(b)fluorathene was detected at 0.24 ppm, which exceeds the RBSC of 0.15 ppm. Sample AP3-SD01 was collected from an area in AP3 where water associated with precipitation events may accumulate. This sample is essentially surface soil and is not from an aquatic environment. Excluding essential human macronutrients (i.e., calcium, chloride, magnesium, phosphorous, potassium, and sodium), 17 metals were detected in sediment sample AP3-SD01. Metal analytes detected included aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. The detection of arsenic in AP3-SD01 was above the RBSC of 3.9 ppm at a concentration of 6.4 ppm. Chromium was also above the RBSC value of 2.9 ppm at a concentration of 6.4 ppm. TOC was measured in the AP3-SD01 sediment sample at a concentration of 28,000 ppm.

5.5 AP1 Overburden/Shale Groundwater Results

On December 11, 12, and 15, 2008, groundwater was collected from four of the six piezometers installed at AP1, PZ-01, PZ-02, PZ-04, and PZ-05. Groundwater from piezometers PZ-03 and PZ-06 were not sampled due to lack of water (dry). A total of six groundwater samples (including one FD and one FS sample) were collected from piezometers. Groundwater samples from two piezometers, PZ-01 and PZ-02, were collected using the low-flow sampling methodology, whereas groundwater from piezometers PZ-04 and PZ-05 was collected using iterative pumping to remove stagnant water. In addition, due to a limited groundwater volume, the sample from piezometer PZ-04 was only analyzed for nitroaromatics and SVOCs. Groundwater from the other piezometers was analyzed for nitroaromatics, SVOCs, metals, hardness, and water quality parameters, as listed in Section 3.3.

Overburden/shale groundwater was also sampled in permanently installed shallow monitoring wells AP1-MW01 (upgradient well), AP1-MW02 (source area well), and AP1-MW03 (downgradient well) in May 2009 during the wet season and also in November 2009 during the dry season. Groundwater was collected during the months of May and November from AP1-MW01 using a bladder pump and the low-flow sampling methodology. Groundwater was collected from AP1-MW02 and AP1-MW03 during the months of May and November by purging with a bladder pump one day and sampling with a new, disposable Teflon bailer the next.

Overburden/shale monitoring well groundwater was analyzed for nitroaromatics, VOCs, SVOCs, metals (filtered and unfiltered), and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ferrous iron, and ORP). Due to lack of water volume in well AP1-MW03 during the month of November, cyanide was not collected. Table 3-5 provides final water quality readings of the groundwater immediately prior to sample collection. Analytical results above the RBSCs and/or BSCs are shown in Tables 5-7 and 5-8 as well as in Figure 5-12.

5.5.1 AP1 Piezometer Analytical Data

December 2008 (Wet Season). Only one nitroaromatic, 4-amino-2,6-dinitrotoluene (4-ADNT), was detected in the groundwater from AP1 piezometer PZ-05 at an estimated concentration of 0.342 ppb. No SVOCs were detected in the groundwater in AP1 piezometers.

Fourteen metals were detected in the three unfiltered overburden/shale groundwater samples from the AP1 piezometers, six of which exceeded the RBSCs. Aluminum exceeded the RBSC of 3,700 ppb and the BSC of 309 ppb in two samples (9,740 ppb in PZ-01 and 3,790 ppb in PZ-02), while in the third sample it only exceeded the BSC (2,080 ppb in PZ-05). Chromium was detected above the RBSC of 0.043 ppb in only one of the three samples at a concentration of 11.2 ppb in PZ-01. Cobalt was detected above the RBSC of 1.1 ppb in only one piezometer, PZ-02, at a concentration of 2.91 ppb. Iron was detected above the RBSC of 2,600 ppb in two samples and the BSC of 1,550 ppb in three samples. Concentrations above the RBSC were 7,030 ppb in PZ-01 and 3,400 ppb in PZ-02. Groundwater from piezometer PZ-05 exceeded the iron BSC with a concentration of 2,580 ppb. Manganese was detected above the RBSC of 88 ppb in two samples, with concentrations of 306 ppb in groundwater from PZ-02 and 3,370 ppb in groundwater from PZ-05. The concentration from piezometer PZ-05 also exceeded the BSC of 636 ppb. Vanadium was detected above the RBSC of 18 ppb in groundwater only from piezometer PZ-01 at a concentration of 19.4 ppb.

Nine metals were detected in the filtered samples from the AP1 piezometers, but only manganese exceeded both the RBSC and BSC. Manganese was detected in filtered groundwater from piezometer PZ-05 at a concentration of 3,540 ppb, exceeding the RBSC of 88 ppb and the BSC of 636 ppb.

5.5.2 AP1 Overburden/Shale Monitoring Well Analytical Data

May 2009 (Wet Season). No nitroaromatics or SVOCs were detected in the overburden/shale wells at AP1.

Only one VOC, chloroform, was detected in groundwater in the overburden/shale monitoring wells, and it was slightly above the RBSC value. Chloroform was detected above the 0.19 ppb RBSC at a concentration of 0.48 ppb from upgradient well AP1-MW01.

Sixteen metals were detected in the unfiltered groundwater from the three overburden/shale monitoring wells; however, only three of these exceeded the RBSC values and only five exceeded BSC values. Aluminum was detected above the BSC value of 309 ppb in only the sample from well AP1-MW03 at a concentration of 1,110 ppb. Cobalt was detected above the RBSC of 1.1 ppb and the BSC value of 12.1 ppb in well AP1-MW01 at a concentration of 22.2 ppb. Cobalt was also detected above the RBSC in well AP1-MW02 at a concentration of 3 ppb.

Iron was above the RBSC and BSC in well AP1-MW01. The concentration above the RBSC of 2,600 ppb and 1,550 ppb BSC was 4,610 ppb. Manganese was detected above the RBSC of 88 ppb in groundwater from all three monitoring wells—AP1-MW01, AP1-MW02, and AP1-MW03—at concentrations of 32,300 ppb, 351 ppb, and 136 ppb, respectively. The manganese concentration from well AP1-MW01 also exceeded the BSC of 636 ppb. Nickel was detected above the BSC value of 8.6 ppb in the samples from wells AP1-MW01 (13.3 ppb) and AP1-MW02 (15.2 ppb).

Eighteen metals were detected in the filtered groundwater sample from the overburden/shale monitoring wells; however, only three of these exceeded their RBSC values and four compounds exceeded their BSC value. Cobalt was detected above the RBSC of 1.1 ppb in well AP1-MW01 at a concentration of 22.5 ppb and in well AP1-MW02 at a concentration of 3.2 ppb. The cobalt concentration from well AP1-MW01 also exceeded the BSC value of 12.1 ppb. Iron was detected above the RBSC of 2,600 ppb and BSC of 1,550 ppb in well AP1-MW01 at a concentration of 4,590 ppb. Manganese was detected above the RBSC of 88 ppb in the samples from all three wells at concentrations of 32,100 ppb (AP1-MW01), 355 ppb (AP1-MW02), and 102 ppb (AP1-MW03). From well AP1-MW03, manganese was also above the BSC of 636 ppb. Nickel was detected above the BSC of 8.6 ppb in the samples from AP1-MW01 and AP1-MW02 at concentrations of 12.8 ppb and 14.8 ppb, respectively.

November 2009 (Dry Season). Two nitroaromatics (2-nitrotoluene [2-NT] and 4-nitrotoluene [4-NT]) were detected in the groundwater sample from well AP1-MW01 at concentrations below their respective RBSCs. No VOCs or SVOCs were detected in the overburden/shale wells at AP1.

Fourteen metals were detected in the unfiltered groundwater samples from the three overburden/shale monitoring wells; however, only four of these exceeded RBSC values and only two exceeded BSC values. Arsenic was detected above the RBSC value of 0.045 ppb in the sample from well AP1-MW01 at a concentration of 5.4 ppb and in well AP1-MW03 at a concentration of 6.3 ppb. Cobalt was detected above the RBSC of 1.1 ppb in all three monitoring wells—AP1-MW01, AP1-MW02, and AP1-MW03—at concentrations of 6.8 ppb, 3.6 ppb, and 2.7 ppb, respectively. Iron was detected above both the RBSC of 2,600 ppb and BSC of 1,550 ppb in the groundwater sample from well AP1-MW01 at a concentration of 4,410 ppb. Manganese was detected above the RBSC of 88 ppb in groundwater from all three monitoring wells—AP1-MW01, AP1-MW02, and AP1-MW03—at concentrations of 8,290 ppb, 436 ppb,

and 463 ppb, respectively. The manganese concentration from well AP1-MW01 also exceeded the BSC of 636 ppb.

Sixteen metals were detected in the filtered groundwater samples from the overburden/shale monitoring wells; however, only five of these exceeded the RBSC values and four compounds exceeded their BSC value. Aluminum exceeded the BSC screening level of 309 ppb in well AP1-MW03, with a result of 3,320 ppb. Arsenic was detected above the RBSC of 0.045 ppb in well AP1-MW01, with a concentration of 6.2 ppb and well AP1-MW03 with a concentration of 5.7 ppb. Chromium was detected above the RBSC of 0.043 ppb in well AP1-MW03 with a result of 5.5 ppb. Cobalt was detected above the RBSC of 1.1 ppb in well AP1-MW01 at a concentration of 5.1 ppb, in well AP1-MW02 with a concentration of 3.6 ppb, and in well AP1-MW03 at a concentration of 5.1 ppb. Iron was detected above the RBSC of 2,600 ppb and BSC of 1,550 ppb in wells AP1-MW01 at a concentration of 4,990 ppb and in AP1-MW03 at a concentration of 6,070 ppb. Manganese was detected above the RBSC of 88 ppb in the samples from all three wells at concentrations of 6,270 ppb (AP1-MW01), 410 ppb (AP1-MW02), and 550 ppb (AP1-MW03). Manganese from well AP1-MW0 was also above the BSC of 636 ppb. Nickel was detected above the BSC of 8.6 ppb in the sample from well AP1-MW03 at concentration of 13.4 ppb.

5.6 AP1 Bedrock Groundwater Results

In conjunction with the groundwater sampling of the overburden/shale monitoring wells, groundwater was also sampled in the permanently installed bedrock monitoring wells (AP1-BEDGW-001 [upgradient well], AP1-BEDGW-002 [source area well], and IT-MNTA-BEDGW-001 [downgradient well]). Monitoring well screens from all three of the bedrock monitoring wells are located within the Delaware Limestone bedrock unit. Like the overburden/shale wells, groundwater was sampled near the end of May 2009 during the wet season and also sampled in November 2009 during the PBOW dry season. Groundwater from two of the bedrock wells (AP1-BEDGW-002 and IT-MNTA-BEDGW-001) was collected during both sampling events by purging with a bladder pump and sampling the next day with a new Teflon bailer. Natural hydrocarbon was found on top of the groundwater in well AP1-BEDGW-001 during both sampling events. To prevent equipment from possible permanent staining and damage, the product was removed from the well. Groundwater was purged using a disposable bailer and was sampled the following day with a new Teflon bailer. Groundwater was analyzed for nitroaromatics, metals (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total

suspended solids, turbidity, ferrous iron, and ORP). Table 3-5 provides final water quality readings of the groundwater immediately prior to sample collection. Table 5-8 and Figure 5-13 show analytical results above the RBSCs and/or BSCs.

May 2009 (Wet Season). No nitroaromatics were detected in the groundwater from bedrock monitoring wells during the PBOW wet season month of May. Ten VOCs were detected in the groundwater from the bedrock monitoring wells during this event, seven of which exceeded RBSCs and four exceeded BSCs. Benzene was detected above both the RBSC of 0.41 ppb and the BSC of 2.4 ppb in wells AP1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 613 ppb and 67.1 ppb, respectively. Chloroform was detected above the RBSC of 0.19 ppb in the samples from AP1-BEDGW-001 and IT-MNTA-BEDGW-001 at concentrations of 18 ppb and 66.7 ppb, respectively. Ethylbenzene was detected above the RBSC of 1.5 ppb and the BSC of 0.87 ppb in all three wells and ranged from 16.7 ppb in IT-MNTA-BEDGW-001 to a high of 126 ppb in AP1-BEDGW-001. Methylene chloride was detected above the RBSC of 4.8 ppb in the samples from AP1-BEDGW-001 at a concentration of 11.2 ppb and IT-MNTA-BEDGW-001 at a concentration of 77.6 ppb. 1,1,2,2-Tetrachloroethane was detected above the RBSC of 0.067 ppb in well AP1-BEDGW-002 at a concentration of 0.53 ppb. Toluene was detected above the RBSC of 230 ppb in well AP1-BEDGW-001 and above the BSC of 1.7 ppb in all three wells, with concentrations ranging from 14.2 ppb in IT-MNTA-BEDGW-001 to a high of 490 ppb in AP1-BEDGW-001. Total xylenes were detected above both the RBSC of 20 ppb and the BSC of 5.5 ppb in all three wells and ranged from 235 ppb in IT-MNTA-BEDGW-001 to a high of 1,060 ppb in AP1-BEDGW-001.

Six SVOCs were detected in the groundwater from the bedrock monitoring wells; however, only two exceeded RBSCs. 2-Methylnaphthalene was detected above the RBSC of 15 ppb in the samples from wells IT-MNTA-BEDGW-001 and AP1-BEDGW-001 at concentrations of 71 and 36.2 ppb, respectively. Naphthalene was detected above the RBSC of 0.14 ppb in all three wells and ranged from 11.8 ppb in AP1-BEDGW-002 to a high of 33 ppb in AP1-BEDGW-001.

Eighteen metals were detected in the unfiltered groundwater samples from the bedrock monitoring wells; however, only five exceeded RBSCs and only five exceeded BSCs. Antimony was detected above the RBSC of 1.5 ppb in AP1-BEDGW-002 at a concentration of 5.8 ppb. Arsenic was detected above the RBSC of 0.045 ppb and the BSC of 7.4 ppb in wells AP1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 69.7 and 101 ppb, respectively. Barium was detected above the RBSC of 730 ppb only in the sample from AP1-BEDGW-001 at

a concentration of 897 ppb. Calcium was detected above the BSC of 316,000 in the sample from well AP1-BEDGW-001 at a concentration of 573,000 ppb. Iron was detected above the RBSC of 2,600 ppb and the BSC of 1,550 ppb only in the sample from AP1-BEDGW-001 at a concentration of 4,910 ppb. Magnesium was detected above the BSC of 217,000 ppb in two wells at concentrations of 234,000 ppb in IT-MNTA-BEDGW-001 and of 418,000 ppb in AP1-BEDGW-001. Manganese was detected above the RBSC of 88 ppb in all three wells and ranged from 95.5 ppb in IT-MNTA-BEDGW-001 to a high of 857 ppb in AP1-BEDGW-001, which also exceeded the BSC of 636 ppb.

Seventeen metals were detected in the filtered groundwater samples from the bedrock monitoring wells; however, only four exceeded RBSCs and seven exceeded BSCs. Aluminum exceeded the 309 ppb BSC in well AP1-BEDGW-002, with a concentration of 409 ppb. Arsenic was detected above the RBSC of 0.045 ppb and the BSC of 7.4 ppb in the samples from AP1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 65.6 and 77.7 ppb, respectively. Barium was detected above the RBSC of 730 ppb only in the sample from well AP1-BEDGW-001 at a concentration of 813 ppb. Calcium was detected above the BSC of 316,000 ppb in the sample from well AP1-BEDGW-001 at a concentration of 521,000 ppb. Copper exceeded the BSC of 19.8 ppb in well AP1-BEDGW-002 at a concentration of 43.1 ppb. Magnesium was detected above the BSC of 217,000 ppb in two samples at concentrations of 427,000 ppb in AP1-BEDGW-001 and 231,000 ppb in well IT-MNTA-BEDGW-001. Manganese was detected above the RBSC of 88 ppb in the samples from wells AP1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 804 ppb and 379 ppb, respectively. Manganese also exceeded the BSC of 636 ppb in the sample from well AP1-BEDGW-001 at a concentration of 804 ppb. Nickel was above the BSC of 8.6 ppb in well AP1-BEDGW-002, with a concentration of 55.2 ppb. Cyanide was detected above the RBSC of 73 ppb only in the sample from well AP1-BEDGW-002 at a concentration of 120 ppb.

November 2009 (Dry Season). Like the wet season month of May, nitroaromatics were not detected in the November 2009 bedrock groundwater at AP1. Twelve VOCs were detected in the groundwater from the bedrock monitoring wells during this event, eight of which exceeded RBSCs and four exceeded BSCs. Benzene was detected above both the RBSC of 0.41 ppb and the BSC of 2.4 ppb in all three of the wells—AP1-BEDGW-001, AP1-BEDGW-002, and IT-MNTA-BEDGW-001—at concentrations of 1,300 ppb, 27.5 ppb, and 3.7 ppb, respectively. Chloroform was detected above the RBSC of 0.19 ppb in only well AP1-BEDGW-002 at a concentration of 12 ppb. Chloromethane was detected above the RBSC of 19 ppb in well AP1-

BEDGW-002. Ethylbenzene was detected above the RBSC of 1.5 ppb and the BSC of 0.87 ppb in all three wells and ranged from 9.9 ppb in IT-MNTA-BEDGW-001 to a high of 176 ppb in AP1-BEDGW-001. Methylene chloride was detected above the RBSC of 4.8 ppb in only well AP1-BEDGW-001 at a concentration of 28.8 ppb. 1,1,2,2-Tetrachloroethane was detected above the RBSC of 0.067 ppb in IT-MNTA-BEDGW-001 at a concentration of 1.2 ppb. Toluene was detected above the RBSC of 230 ppb and BSC of 1.7 ppb in well AP1-BEDGW-001 at a concentration of 730 ppb, while only results of 10 ppb from well IT-MNTA-BEDGW-001 and 43.6 ppb from well AP1-BEDGW-002 exceeded the BSC. Total xylenes were detected above both the RBSC of 20 ppb and the BSC of 5.5 ppb in all three wells and ranged from 136 ppb in IT-MNTA-BEDGW-001 to a high of 1,340 ppb in AP1-BEDGW-001.

Seven SVOCs were detected in the groundwater from the bedrock monitoring wells; however, only two exceeded RBSCs. 2-Methylnaphthalene was detected above the RBSC of 15 ppb in the samples from IT-MNTA-BEDGW-001 and AP1-BEDGW-001at concentrations of 256 and 32.7 ppb, respectively. Naphthalene was detected above the RBSC of 0.14 ppb in all three wells and ranged from 15.3 ppb in AP1-BEDGW-002 to a high of 64.9 ppb in IT-MNTA-BEDGW-001.

Thirteen metals were detected in the unfiltered groundwater samples from the bedrock monitoring wells; however, only three exceeded RBSCs and seven exceeded BSCs. Arsenic was detected above both the RBSC of 0.045 ppb and the BSC of 7.4 ppb in wells AP1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 110 and 50.7 ppb, respectively. Barium was detected above the RBSC of 730 ppb only in the sample from AP1-BEDGW-001 at a concentration of 989 ppb. Calcium was detected above the BSC of 316,000 in the sample from AP1-BEDGW-001 at a concentration of 590,000 ppb. Iron was detected above the BSC of 1,550 ppb only in the sample from AP1-BEDGW-001 at a concentration of 1,570 ppb. Magnesium was detected above the BSC of 217,000 ppb in well AP1-BEDGW-001 at a result of 479,000 ppb. Manganese was detected above the RBSC of 88 ppb and the BSC of 636 ppb at a concentration of 704 ppb. Potassium was detected above the BSC of 116,000 ppb in wells AP1-BEDGW-001 at a concentration of 129,000 ppb and IT-MNTA-BEDGW-001 at a concentration of 120,000 ppb. Sodium also exceeded the BSC of 1,390,000 ppb in well AP1-BEDGW-001 with a result of 1,470,000 ppb.

Twelve metals were detected in the filtered groundwater samples from the bedrock monitoring wells; however, only three exceeded RBSCs and six exceeded BSCs. Arsenic was detected

above the RBSC of 0.045 ppb and the BSC of 7.4 ppb in the samples from wells P1-BEDGW-001 and AP1-BEDGW-002 at concentrations of 133 and 36.7 ppb, respectively. Barium was detected above the RBSC of 730 ppb only in the sample from well AP1-BEDGW-001 at a concentration of 961 ppb. Calcium was detected above the BSC of 316,000 ppb in the sample from AP1-BEDGW-001 at a concentration of 596,000 ppb. Magnesium was detected above the BSC of 217,000 ppb in well AP1-BEDGW-001 at a concentration of 471,000 ppb. Manganese was detected above the RBSC of 88 ppb and the BSC of 636 ppb in AP1-BEDGW-001 at a concentration of 658 ppb. As for the unfiltered samples, potassium was detected above the BSC of 116,000 ppb in wells AP1-BEDGW-001 at a concentration of 131,000 ppb and IT-MNTA-BEDGW-001 at a concentration of 120,000 ppb. Sodium also exceeded the BSC of 1,390,000 ppb in well AP1-BEDGW-001 with a result of 1,410,000 ppb.

6.0 Summary and Conclusions

This chapter presents conclusions of RI activities conducted at AP1 and AP3. Activities at AP1 were conducted from December 2008 to November 2009 and included soil borehole drilling, temporary piezometer installation, soil sample collection, overburden/shale groundwater sampling from temporary piezometers, permanent overburden/shale and Delaware Limestone bedrock monitoring well installation, two rounds of groundwater sampling from monitoring wells (one in the PBOW derived wet season and one in the dry season), surface water and sediment sampling, and IDW management and disposal. Activities at AP3 were conducted in May and August, 2009, and included surface water, sediment, and soil sample collection. Analytical results obtained from all samples were screened against the RBSC and BSC values. RBSC values do not infer a regulatory limit or mandated cleanup level, nor does an exceedance necessarily represent an unacceptable human health risk. They are used in this report only as points of reference. BSC values were derived from PBOW background samples and were also used as points of reference.

6.1 Ash Pit 1 Summary and Conclusions

6.1.1 Ash Pit 1 Surface Water Summary

Four surface water samples were collected from AP1, three from the unnamed tributary located west of the site and one in a low, wet area in the northern portion of AP1. Surface water samples were analyzed for nitroaromatics, SVOCs, metals, PCBs, and water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature). The major findings from AP1 surface water are summarized as follows:

- No nitroaromatics, SVOCs, or PCBs were detected in any of the surface water samples.
- Arsenic, chromium, and lead were detected above RBSC levels in the sample located in the wet area in the northern portion of AP1. These inorganics were detected above RBSCs only in this sample.

6.1.2 Ash Pit 1 Sediment Summary

Four sediment samples were collocated with the surface water samples, three were collected in the unnamed drainage ditch west of AP1 and one in the low lying wet area in the northern portion of AP1. Sediment samples were analyzed for nitroaromatics, SVOCs, metals, and PCBs,

and one sample, AP1-SD01, was also analyzed for TOC. The major findings from AP1 sediment are summarized as follows:

- No nitroaromatics were detected in the sediment samples.
- Eleven SVOCs were detected (ten from the sample located in the wet area in the northern portion of AP1). Of these, only the PAHs benzo(a)pyrene and benzo(b)fluoranthene exceeded RBSCs and only in Sample AP-SD01.
- Two PCBs (Aroclor 1254 and 1260) were detected in two samples below respective RBSCs.
- Arsenic and chromium are the only inorganics exceeding RBSCs; these were detected above the RBSCs in each sample.
- TOC was found at concentrations of 21,000 ppm and 43,000 ppm in two of the samples analyzed for TOC.

The PAH exceedances were detected in sample AP1-SD04. This sample was collected from an area within AP1 in which water associated with precipitation events may collect and which is not an aquatic environment. Thus, this sample is likely analogous to surface soil.

6.1.3 Ash Pit 1 Soil Summary

A total of 30 soil samples (including QA samples) were collected at AP1—10 surface soil samples (0 to 1 foot, 0.5 to 1.5 feet and 0.8 to 1.8 feet depths) and 20 subsurface soil samples (3 to 5 feet and 8 to 10 feet). Soil samples from surface depths and from 3 to 5 feet bgs were analyzed for nitroaromatics, metals, PCBs, and SVOCs; and one surface soil sample was analyzed for TOC. Soil from 8 to 10 feet bgs was analyzed for nitroaromatics, metals, and SVOCs. The major findings from AP1 soil are summarized as follows:

- No nitroaromatics were detected in surface or subsurface soil samples at AP1.
- No PCBs were detected in subsurface soil samples and no PCBs were detected above RBSCs in surface soil.
- SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected above RBSCs in the surface soil from boring SB-08.

- Among subsurface soil samples, only SVOCs benzo(a)anthracene and indeno(1,2,3-cd)pyrene were detected above RBSCs, and only from boring SB-08 at the sample depth of 3 to 5 feet.

- Seven metals (aluminum, arsenic, beryllium, chromium, cobalt, iron, and manganese) were detected in the surface soil above the RBSC in nearly all of the samples; and two metals, beryllium and mercury, were above BSC values. Beryllium was the only metal in the surface soil to exceed both the RBSC and BSC.

- Seven metals (aluminum, arsenic, cadmium, chromium, cobalt, iron, and manganese) were detected above the RBSC in nearly all of the subsurface soil samples (except for cadmium, which was detected in only one sample); three metals, beryllium, magnesium, and manganese, were above BSC values. Manganese was the only metal in the subsurface soil to exceed both the RBSC and BSC.

- TOC was measured at 55.3 ppm in the surface soil sample.

6.1.4 Ash Pit 1 Groundwater Summary

6.1.4.1 Overburden/Shale Piezometer Groundwater Summary

In December 2008, six groundwater samples were collected from four temporary piezometers (FD and FS samples included in total). Groundwater from three of the piezometers (PZ-01, PZ-02, and PZ-05) was analyzed for nitroaromatics, SVOCs, metals (filtered and unfiltered), hardness, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate, sulfate, total dissolved solids, total suspended solids, turbidity, ORP, and ferrous iron). Due to lack of groundwater volume, the sample from PZ-04 was only analyzed for nitroaromatics and SVOCs. The major findings are summarized as follows:

- Only one nitroaromatic, 4-ADNT, was detected in the groundwater; and it was found in piezometer PZ-05, far below the RBSC of 7.3 ppb.

- No SVOCs were detected in the groundwater samples.

- Aluminum, iron, and manganese exceeded both the RBSC and the BSC in the unfiltered sample.

- Only manganese exceeded both the RBSC and BSC in the filtered samples.

6.1.4.2 Overburden/Shale Monitoring Well Groundwater Summary

Three groundwater samples were collected from newly installed wells during the wet season month of May 2009, and three were collected during the dry season month of November 2009.

Groundwater was analyzed for nitroaromatics, metals (filtered and unfiltered), VOCs, SVOCs, and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids, total suspended solids, turbidity, ORP, and ferrous iron). The major findings related to monitoring well location (upgradient, source area, and downgradient) are summarized as follows:

- No significant variable difference between the number of analytes detected was distinguished among the upgradient, source area, and downgradient monitoring wells or the time/season for sampling.

- Upgradient Well
  - Nitroaromatics 2-NT and 4-NT were detected below the RBSC in upgradient well AP1-MW01 during the dry season sampling event in November 2009.
  - VOC compound chloroform exceeded the RBSC during the wet season sampling event in May 2009.
  - Three metals (arsenic, cobalt, and iron) exceeded both the RBSC and/or BSC in the unfiltered and filtered groundwater samples.

- Source Area Well
  - No nitroaromatics, VOCs, or SVOCs were detected in the source area well, AP1-MW02, during either sampling event.
  - Seven metals exceeded the RBSC and/or BSC, but only iron exceeded both screening levels during the dry season (November) event in the filtered groundwater sample.

- Downgradient Well
  - No nitroaromatics, VOCs, or SVOCs were detected in the downgradient well AP1-MW03 during either sampling event.
  - Two metals (cobalt and manganese) exceeded the RBSC in the unfiltered and filtered groundwater samples.

6.1.4.3 Bedrock Groundwater Summary

Three groundwater samples were collected during the wet season month of May 2009, and three groundwater samples were collected during the dry season month of November 2009 from the two newly installed bedrock wells and the existing well MNTA-BEDGW-001. Groundwater samples were collected from wells AP1-BEDGW-001 (upgradient well), AP1-BEDGW-002 (source area well), and IT-MNTA-BEDGW-001 (downgradient well). Groundwater was analyzed for nitroaromatics, VOCs, SVOCs, metals (filtered and unfiltered), and water quality parameters (alkalinity, chloride, cyanide, hardness, nitrate/nitrite, sulfate, total dissolved solids,

total suspended solids, turbidity, ferrous iron, and ORP). The major findings related to monitoring well location (upgradient, source area, and downgradient) are summarized as follows:

- No significant variable difference between the number of analytes detected was distinguished between the upgradient, source area, and downgradient monitoring wells or time of season for the sampling.

- Upgradient Well
  - Six VOCs exceeded RBSCs and four exceeded BSCs during the wet and dry season sampling events from upgradient bedrock well AP1-BEDGW-001. Hydrocarbon-related compounds benzene, ethylbenzene, toluene, and total xylenes were above RBSCs and BSCs during both sampling events. Chloroform was above the RBSC during the wet season, and methylene chloride was above the RBSC during both the wet (May) and dry (November) season.
  - Two hydrocarbon-related SVOCs were detected above RBSCs during both sampling events and included 2-methylnaphthalene and naphthalene.
  - Nine metals exceeded the RBSC and/or BSC in the filtered and unfiltered groundwater samples during both sampling events, but only arsenic, iron, and manganese exceeded both screening levels during the groundwater sampling.

- Source Area Well
  - Six VOCs exceeded RBSCs and four exceeded BSCs during the wet season sampling event from source area bedrock well AP1-BEDGW-002. Hydrocarbon-related compounds benzene, ethylbenzene, toluene, and total xylenes were above RBSCs and/or BSCs. Chloroform and chloromethane were also above the RBSC during the dry season, and 1,1,2,2-tetrachloroethane was above the RBSC during the wet season.
  - Hydrocarbon-related SVOC naphthalene was above the RBSC during the both the wet and dry season sampling events.
  - Five metals exceeded the RBSC and/or BSC in the filtered and unfiltered groundwater samples during both sampling events, but only arsenic exceeded both screening levels during both the wet and dry season groundwater sampling.
  - Cyanide exceeded the RBSC during the wet season (May) sampling event.

- Downgradient Well
  - Six VOCs exceeded RBSCs and four exceeded BSCs during the wet and dry season sampling events from downgradient bedrock well IT-MNTA-BEDGW-001. Hydrocarbon related compounds ethylbenzene, toluene, and total xylenes were above RBSCs and/or BSCs during both sampling events.

- Benzene was not detected during the wet season sampling but was above the RBSC and BSC during the dry season. Chloroform and methylene chloride were above the RBSC during the wet season and 1,1,2,2-tetrachloroethane was above the RBSC during the dry season.
- Two hydrocarbon related SVOCs were detected above RBSCs during both sampling events and included 2-methylnaphthalene and naphthalene.
- Two metals exceeded the BSC in the filtered and unfiltered groundwater samples during both sampling events and manganese exceeded only the RBSC during the wet season. No compound exceeded both the RBSC and BSC.

6.1.4.4 Ash Pit 1 Conclusions

Based on the analytical data, limited impact has occurred as the result of activities associated with AP1. The site soils data do not reflect an appreciable impact relative to metals. Arsenic and chromium detections above RBSCs in sediment likely reflect natural conditions at the site associated with PBOW soils. These same two metals, as well as lead, were detected in surface water and may be the result of suspended sediment. The only potentially site-related compounds present in surface soil and sediment were PAHs, presumably a result of the incomplete combustion of coal. It is noted that the detections of PAHs in sediment were only in sample AP1-SD04, which was located in a low-lying area within AP1. Water accumulated in this area is associated with precipitation events. Thus, the area in which this sample was collected is not aquatic habitat, and this sediment sample is essentially surface soil. While some of the PAHs exceeded RBSCs, the limited detections in surface soil and subsurface soil do not suggest widespread impact. Further, overburden groundwater does not indicate sourcing to groundwater from surface and subsurface soils. These findings are consistent with the relatively immobile nature of metals and PAHs in soil. Bedrock groundwater has not been impacted by site activities, with the detected constituents resulting from the natural reducing conditions and associated petroleum present in the Delaware Limestone.

6.2 Ash Pit 3 Summary and Conclusions

6.2.1 Ash Pit 3 Surface Water

Three surface water samples were collected from AP3—one near the former ash slurry discharge line and two from the drainage ditch exiting AP3. Surface water samples were analyzed only for nitroaromatics and water quality readings (ORP, pH, conductivity, turbidity, dissolved oxygen, and temperature). Nitroaromatics were not detected in any of the surface water samples.

6.2.2 Ash Pit 3 Sediment

Three sediment samples were collocated with the surface water samples in AP3, one near the former ash slurry discharge line and the other two from the drainage ditch exiting AP3. One sediment sample (AP3-SD01) was analyzed for nitroaromatics, SVOCs, PCBs, metals, and TOC, and the other two sediment samples (AP3-SD02 and AP3-SD03) were analyzed only for nitroaromatics and PCBs. Note that SVOCs and metals were analyzed for in the samples collected from locations AP3-SD02 and AP2-SD03 during the 1999 SI (PBOW99SDA302 and PBOWSDA301, respectively).The major findings from AP3 sediments are summarized as follows:

- No nitroaromatics or PCBs were detected in any sediment samples.
- Two SVOC PAHs, benzo(a)pyrene and benzo(b)floranthene, were detected above the RBSCs in the one AP3 sediment sample (AP3-SD01) analyzed for them in 2009; no PAHs were detected in the 1999 sediment samples.
- Only arsenic and chromium were detected above the RBSCs in the 2009 sediment samples.
- TOC was measured at 28,000 ppm.

Sample AP3-SD01, in which PAHs were detected, was collected directly from within AP3, as were the soil samples. It was collocated with the 1999 sample designated as PBOWSDA303. The area from which it was collected is not an aquatic habitat, but is an area where water associated with precipitation events may collect seasonally. As such, this sample is more analogous to a soil sample than to the other sediment samples collected from the stream. PAHs were not detected in the 1999 sediment samples which were collected from the stream.

6.3 Ash Pit 3 Soil Sample Summary

A total of 21 soil samples (including QA samples) were collected at AP3: 10 surface soil samples and 11 subsurface soil samples. Borings at AP3 were drilled with a hand auger to total depths ranging from 1.5 to 5 feet bgs. Soil samples were collected from material within and below the ash layer. Soil samples were analyzed for nitroaromatics, SVOCs, metals, and PCBs. The major findings from AP3 soil are summarized as follows:

- One nitroaromatic, 2,6-DNT, was detected in four surface soil samples and one subsurface soil sample; but all detections were below the 0.71 ppm RBSC.

- One PCB compound (Aroclor 1260) was detected in two surface soil samples, but both detections were below the 0.22 ppm RBSC.
- No PCBs were detected in the subsurface soil samples.
- SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were detected above RBSCs in the surface soil sample from boring SB-01. SVOCs were not detected in subsurface soil.
- Arsenic was the only metal to exceed both the RBSC and BSC in surface soil. No metals were detected in subsurface soil at concentration exceeding both RBSCs and BSCs.

6.4 Ash Pit 3 Conclusions

As with AP1, limited impact to site media has occurred as a result of AP3 activities. Consistent with AP1, SVOCs related to incomplete combustion of coal were detected in one surface sample and in a sediment sample (AP3-SD01) that was collected from the same area as the soil samples, but SVOCs were not detected in any subsurface samples. In addition, Aroclor 1260 and arsenic were also detected at low concentrations in surface soil. The data do not suggest a widespread impact to site surface or subsurface soils.

As noted previously, the AP3 area provided habitat for nesting eagles. Although investigation is possible during certain times of the year (i.e., August through December), installation of piezometers and monitoring wells would have resulted in disturbance of the eagles and habitat destruction. After consultation with the USACE, it was determined that a phased approach would be most appropriate for this site. This would allow for the collection of needed surface water, sediment, and soil samples through hand sampling techniques that would not result in appreciable habitat destruction or disturbance of the nesting eagles. The data collected could then be analyzed and evaluated for potential sourcing to groundwater based on the leachability of any detected contaminants, along with comparison of the AP3 site to findings from other similar sites (i.e., AP1 and AP2). Both the AP1 and AP2 sites are similar to AP3, with ash layers detected near the surface and containing similar site related compounds (PAHs and metals). In addition, shallow depth to groundwater was noted at all three ash pits.

For comparison purposes, surface and subsurface soil data and overburden/shale groundwater data for AP2 are presented in Tables 6-1 and 6-2. Groundwater data from AP1 is presented in Table 5-8. As can be seen from the analytical results, the general findings for all three ash pits are similar for SVOCs and metals. Although the sampling focused on the ash layers at each area,

only limited detections of SVOCs are present. In general, each site only had SVOCs present in one or two of the samples and at concentrations below 2 ppm for each individual analyte. In AP1 soils, SVOCs are limited to the upper 5 feet of soil, with no detections in the 8- to 10-foot range. At AP2, the majority of SVOCs detected were in the surface soils, with only low, estimated concentrations (i.e., less than 0.08 ppm) detected in subsurface soil. At AP3, SVOCs were detected only in the surface soil. As previously discussed, a revised sampling approach for AP3 was used to target the ash layer and the soil immediately below the ash layer to determine if leaching of potential site contaminants was occurring. The data suggest that there has been limited vertical transport of SVOCs in the soil column. Evaluation of groundwater data from AP1 and AP2 also support this interpretation. Both AP1 and AP2 had similar hydrogeologic settings to AP3. That is, ash layers were present at shallow depths at all three sites, and the overburden/shale groundwater was present at shallow depths (approximately 2 to 8 feet bgs) at AP1 and AP2. Although the depth to groundwater could not be determined at AP3, field notes indicate that groundwater was not present at depths of 5 feet during the hand auger sampling conducted in August of 2009 (dry season); however, AP3 frequently retains water during the wet period of the year. SVOCs (specifically PAHs) were not detected in any groundwater samples from AP1 and AP2. This finding is consistent with the general interpretation that PAHs are relatively immobile in soil.

Evaluation of the data from AP1 and AP2 indicates that while contaminants are present in the ash layer, appreciable impacts to groundwater have not been observed. This lack of impact likely is due to the limited mobility of PAHs and metals. Given these findings for AP1 and AP2, further investigation of AP3 groundwater is not warranted.

7.0 Recommendations

Based upon the findings presented, the following actions are recommended:

- To further provide bedrock groundwater flow information to the existing sitewide groundwater elevations, the bedrock monitoring wells at AP1 should be added to the sitewide groundwater level measurement activities.

- Given the detections of site-related contaminants above screening criteria in the soil, sediment, overburden/shale groundwater, and bedrock groundwater samples from the AP1 and soil at the AP3 area, a BHHRA and a SLERA should be conducted using the SI and RI data.

- While several VOCs and SVOCs were detected above the RBSCs and/or BSCs in the groundwater in the bedrock wells, the detected VOCs appear to be related to naturally occurring petroleum hydrocarbons. Therefore, no further delineation of bedrock groundwater is warranted.

- Based on the soil results from AP3 and the findings from AP1 and AP2 (Shaw, 2010), it is unlikely that groundwater has been impacted from the limited detection of SVOCs in surface soil at AP3. The clearing of extensive vegetation that would be required to allow access to install additional borings and monitoring wells would result in unnecessary habitat destruction and is not warranted at this time. However, final determination of the necessity to install monitoring wells will be contingent on the findings of the BHHRA report for AP1 and AP2 overburden/shale groundwater.

Planned Activities

- Completion of the BHHRA and SLERA reports (finalization anticipated in early 2011).

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TABLES

Table 1-1

Summary of 1999 SI Surface And Subsurface Soil at Ash Pit 1
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

		LOCATION CODE	PBOW99-SBA101A				PBOW99-SBA102A		PBOW99-SBA103A		PBOW99-SBA103B		PBOW99-SBA104B		PBOW99-SSA101	
		SAMPLE NO	PBOW99SBA101A		PBOW99SBA101A-DUP		PBOW99SBA102A		PBOW99SBA103A		PBOW99SBA103B		PBOW99SBA104B		PBOW99SSA101	
		SAMPLE DATE	11-Jun-99		11-Jun-99		10-Jun-99		10-Jun-99		10-Jun-99		10-Jun-99		10-Jun-99	
		DEPTH	0 - 0.5 Ft		0 - 0.5 Ft		0 - 1 Ft		0 - 1 Ft		1 - 4 Ft		0 - 1 Ft		0 - 0 Ft	
		SAMPLE PURPOSE	REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	PRG	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS																
Aluminum	mg/kg	75,000	7,360		7,740		12,700		8,310		12,600		8,820		16,600	
Arsenic	mg/kg	0.38	6.2		10		19.6		9.4		15.8		14		31.2	
Barium	mg/kg	1,600	49.1		36.9		163		41.3		78.9		160		132	
Beryllium	mg/kg	63	-	-	-	-	-	-	-	-	-	-	-	-	1.5	
Calcium	mg/kg	NE	4,260		3,420		6,600		5,590		3,770		6,080		59,100	
Chromium	mg/kg	38	12.1		14.3		12.2		18.1		20.7		10.5		13.5	
Cobalt	mg/kg	3,300	7.7		-	-	6.8		-	-	14.8		8.6		26	
Copper	mg/kg	2,800	13.8		16.7		32.1		13.5		27.9		24		34.2	
Iron	mg/kg	22,000	18,500		24,700		95,100		29,000		45,500		70,300		73,200	
Lead	mg/kg	400	7		9.6		5.9		8.1		10.9		4.9		5.6	
Magnesium	mg/kg	NE	1,520		1,800		-	-	1,470		4,910		651		3,770	
Manganese	mg/kg	3,100	1,170	J	480		199		125		409		181		1,370	
Nickel	mg/kg	130	26		31.4		16.1		21.1		44.3		16.7		79.2	
Potassium	mg/kg	NE	763		984		1,090		-	-	1,720		781		-	-
Selenium	mg/kg	5	-	-	1		-	-	1.2		0.97		2.7		2.6	
Vanadium	mg/kg	520	16.5		24		17.8		39.2		26.8		14.4		23	
Zinc	mg/kg	12,000	56.2		70.1		10.7		43.5		74.5		11.9		95.8	
Total organic carbon	mg/kg	NE					-	-			1,900					

PRG - Preliminary remediation goal. These values were included on tables in the Limited Site Inspection (LSI) Final Report of the Ash Pits Numbers 1 and 3 (USACE, 2000). They originated from the U.S. Environmental Protection Agency (EPA) Region 9. These values were generally updated updated once annually, usually later in the year. The LSI does not indicate the year for these values, and old PRG tables are not available online or from EPA Region 9. These PRGs were based on a noncancer hazard quotient (HQ) of 1 or an incremental lifetime cancer risk of 1E-6, assuming residential use. For chemicals eliciting both cancer and noncancer effects, the lower of the two concentrations, based on either an HQ of 1 or an ILCR of 1E-6 was selected. These PRGs are no longer regarded as current, but are shown to present the screening process used in the LSI.

mg/kg - Milligram per kilogram or parts per million.
No surface or subsurface soil samples were collected from Ash Pit 3.
Reg - Regular.
FD - Field duplicate.
NE - Not Established.
J qualifier. Analyte present. Reported value may not be accurate or precise.

Note 1: **0.45** Concentration exceeds PRG.
Note 2: Blank cells indicate that compound was analyzed for but was not detected.

Table 1-2

Summary of 1999 SI Surface Water at Ash Pit 1 and Ash Pit 3
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

		LOCATION CODE	PBOW99-SWA101		PBOW99-SWA301		PBOW99-SWA302		PBOW99-SWA303		PBOW99-SWA303	
		SAMPLE NO	PBOW99SWA101		PBOW99SWA301		PBOW99SWA302		PBOW99SWA303		PBOW99SWA303DUP	
		SAMPLE DATE	11-Jun-99		11-Jun-99		11-Jun-99		11-Jun-99		11-Jun-99	
		DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
		SAMPLE PURPOSE	REG		REG		REG		REG		FD	
		LOCATION	Ash Pit 1		Ash Pit 3		Ash Pit 3		Ash Pit 3		Ash Pit 3	
Parameter	Units	PRG	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS												
Aluminum	µg/L	3,700	652		-	-	-	-	-	-	-	-
Calcium	µg/L	NE	36,100		27,900		27,700		24,400		24,500	-
Iron	µg/L	11,000	1,390		687		429		431		251	
Magnesium	µg/L	NE	16,800		9,410		9,470		8,940		9,040	
Manganese	µg/L	1,700	78.8		195		153		48.4	J	34.9	
Sodium	µg/L	NE	26,900		9,740		9,840	-	10,200		10,500	

PRG - Preliminary remediation goal.
Shaded cell indicates value is greater than PRG.
µg/L - parts per billion.
REG - Regular.
NE - Not Established.
Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.

PRG - Preliminary remediation goal. These values were included on tables in the Limited Site Inspection (LSI) Final Report of the Ash Pits Number 1 and 3 (USACE, 2000). They originated from the U.S. Environmental Protection Agency (EPA) Region 9. These values were generally updated updated once annually, usually later in the year. The LSI does not indicate the year for these values, and old PRG tables are not available online or from EPA Region 9. These PRGs were based on a noncancer hazard quotient (HQ) of 1 or an incremental lifetime cancer risk of 1E-6, assuming tap water use. For chemicals eliciting both cancer and noncancer effects, the lower of the two concentrations, based on either an HQ of 1 or an ILCR of 1E-6 was selected. These PRGs are no longer regarded as current, but are shown to present the screening process used in the LSI.

Table 1-3

Summary of 1999 SI Sediment at Ash Pit 1 and Ash Pit 3
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

		LOCATION CODE	PBOW99-SDA301		PBOW99-SDA302		PBOW99-SDA303		PBOW99-SDA303	
		SAMPLE NO	PBOW99SDA101		PBOW99SDA302		PBOW99SDA303		PBOW99SDA303DUP	
		SAMPLE DATE	11-Jun-99		11-Jun-99		11-Jun-99		11-Jun-99	
		DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
		SAMPLE PURPOSE	REG		REG		REG		FD	
		LOCATION	Ash Pit 1		Ash Pit 3		Ash Pit 3		Ash Pit 3	
Parameter	Units	PRG	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	75,000	11,400		7,750		1,800	J	3,150	
Arsenic	mg/kg	0.38	41.5		5.9		3.6		3.8	
Barium	mg/kg	1,600	135		47.8		-	-	-	-
Beryllium	mg/kg	63	0.9		-	-	-	-	-	-
Calcium	mg/kg	NE	5,190	J	18,100		4,560		5,620	
Chromium	mg/kg	38	21.6	J	10.8		5.6		5.2	
Cobalt	mg/kg	3,300	41.4		-	-	-	-	-	-
Copper	mg/kg	2,800	20	J	14.4		71.8		76.2	
Iron	mg/kg	22,000	80,900		12,800		5,880		7,540	
Lead	mg/kg	400	17.3		11.9		5.1		8.3	
Magnesium	mg/kg	NE	17.3		5,670		2,220		2,920	
Manganese	mg/kg	3,100	2,240		318		122		159	
Nickel	mg/kg	130	1,730		12.5		6.3		6.8	
Potassium	mg/kg	NE	47		1,270		-	-	-	-
Selenium	mg/kg	5	1,310		1.1		-	-	-	-
Vanadium	mg/kg	520	73.5	J	19.3		-	-	9.4	
Zinc	mg/kg	12,000	145	J	48.3		24.4		28.2	

PRG - Preliminary remediation goal..
NE - Not established (PRGs).
Shaded cell indicates value is greater than PRG.
mg/kg - Parts per million.
Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.

PRG - Preliminary remediation goal. These values were included on tables in the Limited Site Inspection (LSI) Final Report Area (USACE, 2000). They originated from the U.S. Environmental Protection Agency (EPA) Region 9. These values were generally updated updated once annually, usually later in the year. The LSI does not indicate the year for these values, and old PRG tables are not available online or from EPA Region 9. These PRGs were based on a noncancer hazard quotient (HQ) of 1 or an incremental lifetime cancer risk of 1E-6, assuming residential use. For chemicals eliciting both cancer and noncancer effects, the lower of the two concentrations, based on either an HQ of 1 or an ILCR of 1E-6 was selected. These PRGs are no longer regarded as current, but are shown to present the screening process used in the LSI.

Table 3-1

Summary of Direct-Push Soil and Temporary Piezometer Groundwater Samples Collected - Ash Pit 1
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
Temporary Piezometer					
GW	ASH PIT 1-PZ01	AP3000	12/12/2008	REG	0812042
GW	ASH PIT 1-PZ02	AP3001	12/11/2008	REG	0812042
GW	ASH PIT 1-PZ04	AP3003	12/15/2008	REG	0812046
GW	ASH PIT 1-PZ04	WW3005	12/15/2008	FD	0812046
GW	ASH PIT 1-PZ04	WW3013	12/15/2008	FS	A8L170228
GW	ASH PIT 1-PZ05	AP3004	12/15/2008	REG	0812046
Soil					
SS	ASH PIT 1-SB01	AP0001	12/08/2008	REG	0812032
DS	ASH PIT 1-SB01	AP0002	12/08/2008	REG	0812032
DS	ASH PIT 1-SB01	AP0003	12/08/2008	REG	0812032
SS	ASH PIT 1-SB02	AP0004	12/08/2008	REG	0812032
DS	ASH PIT 1-SB02	AP0005	12/08/2008	REG	0812032
DS	ASH PIT 1-SB02	AP0006	12/08/2008	REG	0812032
SS	ASH PIT 1-SB03	AP0007	12/09/2008	REG	0812033
DS	ASH PIT 1-SB03	AP0008	12/09/2008	REG	0812033
DS	ASH PIT 1-SB03	AP0009	12/09/2008	REG	0812033
SS	ASH PIT 1-SB04	AP0010	12/09/2008	REG	0812033
DS	ASH PIT 1-SB04	AP0011	12/09/2008	REG	0812033
DS	ASH PIT 1-SB04	AP0012	12/09/2008	FD	0812033
DS	ASH PIT 1-SB04	AP0013	12/09/2008	REG	0812033
DS	ASH PIT 1-SB04	AP0062	12/09/2008	FS	A8L130179
SS	ASH PIT 1-SB05	AP0014	12/09/2008	REG	0812033
DS	ASH PIT 1-SB05	AP0015	12/09/2008	REG	0812033
DS	ASH PIT 1-SB05	AP0016	12/09/2008	REG	0812033
SS	ASH PIT 1-SB06	AP0017	12/08/2008	REG	0812032
DS	ASH PIT 1-SB06	AP0018	12/08/2008	REG	0812032
DS	ASH PIT 1-SB06	AP0019	12/08/2008	REG	0812032
SS	ASH PIT 1-SB08	AP0023	12/09/2008	REG	0812033
DS	ASH PIT 1-SB08	AP0024	12/09/2008	REG	0812033
DS	ASH PIT 1-SB08	AP0025	12/09/2008	REG	0812033
SS	ASH PIT 1-SB08	AP0057	12/09/2008	FS	A8L130179
SS	ASH PIT 1-SB08	AP0063	12/09/2008	FD	0812033
SS	ASH PIT 1-SB09	AP0026	12/08/2008	REG	0812032
DS	ASH PIT 1-SB09	AP0027	12/08/2008	REG	0812032
DS	ASH PIT 1-SB09	AP0028	12/08/2008	REG	0812032
DS	ASH PIT 1-SB09	AP0058	12/08/2008	FD	0812032
DS	ASH PIT 1-SB09	AP0061	12/08/2008	FS	A8L130179

Notes:
SDG - Sample Delivery Group.
GW - Groundwater.
SS - Surface Soil.
DS - Deep Soil (subsurface).
REG - Regular sample.
FD - Field Duplicate.
FS - Field Split.

Table 3-2

Summary of Hand Auger Soil Samples Collected - Ash Pit 3
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
Soil					
SS	ASH PIT 3-SB01	AP0032	08/19/2009	REG	F67482
DS	ASH PIT 3-SB01	AP0033	08/19/2009	REG	F67482
SS	ASH PIT 3-SB02	AP0036	08/19/2009	REG	F67482
DS	ASH PIT 3-SB02	AP0037	08/19/2009	REG	F67482
SS	ASH PIT 3-SB03	AP0039	08/19/2009	REG	F67482
DS	ASH PIT 3-SB03	AP0040	08/19/2009	REG	F67482
DS	ASH PIT 3-SB03	AP0040-MS	08/19/2009	MS	F67482
DS	ASH PIT 3-SB03	AP0040-MSD	08/19/2009	MS	F67482
SS	ASH PIT 3-SB04	AP0042	08/21/2009	REG	F67519
DS	ASH PIT 3-SB04	AP0043	08/21/2009	REG	F67519
SS	ASH PIT 3-SB05	AP0045	08/21/2009	REG	F67519
DS	ASH PIT 3-SB05	AP0046	08/21/2009	REG	F67519
SS	ASH PIT 3-SB06	AP0048	08/20/2009	REG	F67519
DS	ASH PIT 3-SB06	AP0049	08/20/2009	REG	F67519
DS	ASH PIT 3-SB06	AP0061A	08/20/2009	REG	F67519
SS	ASH PIT 3-SB07	AP0051	08/21/2009	REG	F67519
DS	ASH PIT 3-SB07	AP0052	08/21/2009	REG	F67519
DS	ASH PIT 3-SB07	AP0059	08/21/2009	FD	F67519
DS	ASH PIT 3-SB07	AP0060	08/21/2009	FS	A9H220159
SS	ASH PIT 3-SB08	AP0054	08/21/2009	REG	F67519
DS	ASH PIT 3-SB08	AP0055	08/21/2009	REG	F67519
DS	ASH PIT 3-SB08	AP0056	08/21/2009	FD	F67519
DS	ASH PIT 3-SB08	AP0057A	08/21/2009	FS	A9H220159

Notes:
SDG - Sample Delivery Group.
SS - Surface Soil.
DS - Deep Soil (subsurface).
REG - Regular sample.
FD - Field Duplicate.
FS - Field Split.

Table 3-3

Monitoring Well Construction Details
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Well ID	Coordinates (Ohio Plane) Northings (y)	Eastings (x)	Well Depth (feet bgs)	Date Installed	Installed By	Casing Type	Casing Diameter (inches)	Borehole Diameter (inches)	Screen Interval (feet bgs)	Geologic Unit Screened	Top of Filter Pack (feet bgs)	TOC Elevation (feet msl)	Ground Elevation (feet msl)	Bedrock Elevation (feet msl)	Well Bottom Elevation (feet msl)
Monitoring Wells Screened in Overburden															
AP1-MW01	623372.09	1918800.20	16.30	3/15/2009	Shaw	PVC (40)	2	8	6.0-16.0	Overburden	4.5	642.93	640.30	NA	624.00
AP1-MW02	623622.450	1918730.130	19.55	3/18/2009	Shaw	PVC (40)	2	8	9.2-19.2	Overburden	7.0	638.01	634.70	NA	615.15
AP1-MW03	623723.440	1918747.060	19.35	3/31/2009	Shaw	PVC (40)	2	8	9.0-19.0	Overburden	7.0	639.06	636.50	NA	617.15
Monitoring Wells Screened in Delaware Limestone															
AP1-BEDGW-001	623369.01	1918892.38	79.35	3/18/2009	Shaw	Steel to 44.8', PVC (40) to 79.35'	2	12" to 24.0', 8" to 44.9', 6" to 81.3'	64.0-79.0	Delaware LM	62.0	644.28	641.80	616.30	562.45
AP1-BEDGW-002	623620.90	1918741.22	59.35	3/25/2009	Shaw	Steel to 40.0', PVC (40) to 59.35'	2	12" to 19.5', 8" to 40.0', 6" to 61.3'	44.0-59.0	Delaware LM	42.0	637.16	634.50	613.10	575.15
MNTA-BEDGW-001	623808.00	1918699.00	64.00	9/22/1997	IT	Steel to 31', PVC (40) to 64'	10" to 31', 2" to 64'	14.25" to 31', 6" to 65'	48.75-63.75	Delaware LM	44	638.40	636.05	611.25	572.05

Coordinates scaled to the Ohio State Plane coordinate system, North Zone, NAD 1983. Vertical datum is NAVD 1929.

Table 3-4

Summary of Monitoring Well Groundwater Samples Collected
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
May 2009					
GW	AP1-MW01	AP3050	05/07/2009	REG	F65191
GW	AP1-MW02	AP3051	05/10/2009	REG	F65209
GW	AP1-MW03	AP3052	05/11/2009	REG	F65208
GW	AP1-BEDGW-001	AP3053	05/09/2009	REG	F65209
GW	AP1-BEDGW-002	AP3054	05/10/2009	REG	F65209
GW	IT-MNTA-BEDGW-001	LB3074	05/19/2009	REG	F65372
November 2009					
GW	AP1-MW01	AP3070	11/04/2009	REG	F69338
GW	AP1-MW02	AP3071	11/06/2009	REG	F69338
GW	AP1-MW03	AP3072	11/06/2009	REG	F69338
GW	AP1-BEDGW-001	AP3073	11/06/2009	REG	F69338
GW	AP1-BEDGW-002	AP3074	11/10/2009	REG	F69416
GW	IT-MNTA-BEDGW-001	BEDGW-001-1109	11/06/2009	REG	F69338

Notes:
SDG - Sample Delivery Group.
GW - Groundwater.
REG - Regular Sample.

Table 3-5

Final Field Measurements of Temporary Piezometer, Monitoring Well, and Surface Water
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Identification	Date	Low-Flow Sampled	Dissolved Oxygen (ppm)	Ferrous Iron (mg/L)	Oxidation Reduction Potential (mV)	pH	Specific Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)
Temporary Piezometer									
ASH PIT 1-PZ01	12-DEC-08	Yes	5.95	0.0	131.2	7.36	0.832	10.12	146.9
ASH PIT 1-PZ02	11-DEC-08	Yes	4.75	0.0	109.4	6.85	0.679	10.34	566.4
ASH PIT 1-PZ04	15-DEC-08	No	7.10	0.0	10.8	7.14	2.46	10.0	1000
ASH PIT 1-PZ05	15-DEC-08	No	13.04	NA	83.0	4.32	0.903	4.32	1000
Overburden/Shale Monitoring Wells									
AP1-MW01	07-MAY-09	Yes	1.85	4.0	-13.7	6.56	1.750	11.16	10.5
AP1-MW02	10-MAY-09	No	9.82	0.0	-320.8	6.75	2.011	11.8	0.0
AP1-MW03	11-MAY-09	No	9.81	NA	-261.8	6.68	0.982	8.72	0.0
AP1-MW01	04-NOV-09	Yes	1.65	2.0	4.6	6.76	1.64	10.76	11.3
AP1-MW02	06-NOV-09	No	6.98	0.0	-24.9	7.28	1.82	10.29	-2.3
AP1-MW03	06-NOV-09	No	1.24	0.0	-12.9	7.13	1.2	11.72	16.6
Delaware Limestone Monitoring Wells									
AP1-BEDGW-001	09-MAY-09	No	9.03	0.0	-513.8	6.52	13.78	11.03	218.9
AP1-BEDGW-002	10-MAY-09	No	8.71	0.0	-418.9	6.43	6.421	9.81	0.0
IT-MNTA-BEDGW-001	19-MAY-09	No	0.28	0.0	-200.8	6.44	10.53	15.17	21.5
AP1-BEDGW-001	06-NOV-09	No	6.31	0.0	-6.3	6.66	14.24	10.95	5.4
AP1-BEDGW-002	10-NOV-09	No	8.52	0.0	-25.3	7.08	6.467	10.54	33.2
IT-MNTA-BEDGW-001	06-NOV-09	No	3.85	0.0	-19.0	6.89	9.365	9.53	13.6
Surface Water									
AP1-SW01	19-MAY-09	NA	4.73	NM	32.5	7.05	1.103	15.08	9.4
AP1-SW02	19-MAY-09	NA	6.65	NM	51.9	7.10	1.046	13.19	0.0
AP1-SW03	19-MAY-09	NA	7.77	NM	175.7	6.78	1.052	12.64	1.3
AP1-SW04	20-MAY-09	NA	7.20	NM	215.1	7.12	1.295	12.43	18.0
AP3-SW01	23-MAY-09	NA	1.04	NM	-107.9	6.63	0.712	25.22	109.1
AP3-SW02	23-MAY-09	NA	2.99	NM	-79.8	6.66	0.712	19.83	6.8
AP3-SW03	27-MAY-09	NA	3.25	NM	-80.8	6.83	0.768	20.67	195.1

Notes:

Water quality measurements recorded by YSI water quality instrument immediately prior to the sample collection time.

No temporary piezometers, overburden/shale, or bedrock wells were installed at Ash Pit 3.

Wells not sampled using the low-flow sampling methodology may present questionable DO measurements.

°C - Degree Celsius.
Eh - oxidation-reduction potential.
L - Liters.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NA - Not Applicable.
NM - Not measured.
NM[a] - Water too turbid to read ferrous iron field test
ppm - Parts per million.
mg/L - Milligrams per liter (ppm).
NTU - Nephelometric turbidity unit.
Ferrous iron measured in field using Hach test kit.

Table 3-6

Summary of Surface Water and Sediment Samples Collected
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
Ash Pit 1					
SD	AP1-SD01	AP1007	05/19/2009	REG	F65380
SD	AP1-SD02	AP1008	05/19/2009	REG	F65374
SD	AP1-SD03	AP1012	05/19/2009	REG	F65374
SD	AP1-SD04	AP1013	05/20/2009	REG	F65380
SW	AP1-SW01	AP2007	05/19/2009	REG	F65381
SW	AP1-SW02	AP2008	05/19/2009	REG	F65373
SW	AP1-SW03	AP2012	05/19/2009	REG	F65373
SW	AP1-SW04	AP2013	05/20/2009	REG	F65381
Ash Pit 3					
SD	AP3-SD01	AP1009	05/23/2009	REG	F65474
SD	AP3-SD02	AP1010	05/23/2009	REG	F65474
SD	AP3-SD03	AP1011	05/23/2009	REG	F65474
SW	AP3-SW01	AP2009	05/23/2009	REG	F65472
SW	AP3-SW02	AP2010	05/23/2009	REG	F65472
SW	AP3-SW03	AP2011A	05/27/2009	REG	F65523

Notes:
SDG - Sample Delivery Group.
SD - Sediment.
SW - Surface Water.
REG - Regular Sample.

Table 4-1

Summary of Analytical Parameters and Methods for Soil, Groundwater, Surface Water, and Sediment Samples
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Matrix	Analytical Parameters	Analytical Method
Soil	Nitroaromatic Compounds	SW-846 3535/8330A
	TAL Metals (T/D)	SW-846 3005A/6010B/6020A/7470A/7471A
	PCBs	SW-846 8082
	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
	Percent Solids	EPA 160.3/SM19 2540B M
	Total Organic Carbon	SW-846 9060/Walkley-Black
Groundwater	Nitroaromatic Compounds	SW-846 3535/8330A
	TAL Metals (T/D)	SW-846 3005A/6010B/6020A/7470A
	TCL Volatile Organic Compounds	SW-846 5030B/8260B
	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
	Alkalinity	EPA 310.1/SM19 2320B
	Chloride	EPA 300.0/SW9056
	Cyanide, total	EPA 335.2/EPA 335.4
	Hardness	SM19 2340B
	Nitrate/Nitrite	EPA 353.2/SM-4500-NO3 E
	Sulfate	EPA 300.0/SW-846 9056
	Total Dissolved Solids	EPA 160.1/SM19 2540C
	Total Suspended Solids	EPA 160.2/SM19 2540D
	Turbidity	EPA 180.1
Surface Water	Nitroaromatic Compounds	SW-846 3535/8330A
	TAL Metals (T/D)	SW-846 3005A/6010B/7470A
	PCBs	SW-846 8082
	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
Sediment	Nitroaromatic Compounds	SW-846 3535/8330
	TAL Metals (T/D)	SW-846 3005A/6010B/7471A
	PCBs	SW-846 8082
	TCL Semivolatile Organic Compounds	SW-846 3510C/8270C
	Percent Solids	SM19 2540B M
	Total Organic Carbon	Walkley-Black

Table 4-2

Background Screening Concentrations for Inorganics and BTEX Compounds in Groundwater Ash Pit 1 and Ash Pit 3 Site Characterization Report Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of Values, µg/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Mean µg/L	Standard Deviation	UTL [a] µg/L	BSC [b] µg/L
Metals - Unfiltered										
Aluminum	11 / 13	85	3.15E+01	3.09E+02	2.00E+02	2.00E+02	1.05E+02	6.98E+01	4.17E+02	309
Arsenic	4 / 26	15	3.30E+00	7.40E+00	1.00E+01	1.00E+01	4.99E+00	6.56E-01	7.92E+00	7.4
Barium	28 / 28	100	2.58E+01	1.18E+04	2.00E+02	2.00E+03	1.73E+03	3.77E+03	1.86E+04	11800
Calcium	28 / 28	100	1.74E+04	3.16E+05	5.00E+03	5.00E+03	1.38E+05	8.31E+04	5.09E+05	316000
Cobalt	6 / 27	22	1.00E+00	1.21E+01	5.00E+01	5.00E+01	2.05E+01	8.75E+00	5.96E+01	12.1
Copper	2 / 28	7	3.30E+00	1.98E+01	2.50E+01	2.50E+01	1.24E+01	2.26E+00	2.25E+01	19.8
Iron	24 / 27	89	3.82E+01	1.55E+03	1.00E+02	1.00E+02	4.15E+02	4.87E+02	2.59E+03	1550
Magnesium	28 / 28	100	7.28E+03	2.17E+05	5.00E+03	5.00E+03	7.17E+04	5.85E+04	3.33E+05	217000
Manganese	28 / 28	100	3.60E+00	6.88E+02	1.50E+01	1.50E+01	8.12E+01	1.24E+02	6.36E+02	636
Nickel	4 / 27	15	4.80E+00	8.60E+00	4.00E+01	4.00E+01	1.81E+01	4.67E+00	3.90E+01	8.6
Potassium	28 / 28	100	2.53E+03	1.16E+05	5.00E+03	5.00E+04	2.70E+04	3.06E+04	1.64E+05	116000
Sodium	28 / 28	100	1.33E+04	1.39E+06	5.00E+03	5.00E+04	3.55E+05	4.36E+05	2.30E+06	1390000
Zinc	14 / 19	74	8.30E-01	5.07E+02	2.00E+01	2.00E+01	5.55E+01	1.23E+02	6.06E+02	507
Volatile Organic Compounds										
Benzene	9 / 28	32	1.45E-01	2.40E+00	1.00E+00	5.00E+00	6.73E-01	5.43E-01	3.10E+00	2.4
Ethylbenzene	6 / 28	21	1.30E-01	8.70E-01	1.00E+00	5.00E+00	5.82E-01	4.00E-01	2.37E+00	0.87
Toluene	8 / 28	29	1.20E-01	1.70E+00	1.00E+00	5.00E+00	4.99E-01	2.83E-01	1.76E+00	1.7
Xylenes, total	8 / 28	29	3.60E-01	5.50E+00	1.00E+00	5.00E+00	1.22E+00	1.53E+00	8.07E+00	5.5

[a] The UTL (upper tolerance limit) is calculated using the Chebychev equation (mean + 4.47 * standard deviation).

[b] The BSC (background screening criterion) is the calculated UTL or the maximum detected concentration, whichever is less.

µg/L - Micrograms per liter.

mg/L - Milligrams per liter.

BTEX - Benzene, toluene, ethylbenzene, and xylenes.

Source: Shaw Environmental, Inc., 2005, 2004 Data Summary and Evaluation Report, Final, Plum Brook Ordnance Works, Sandusky, Ohio, April.

Table 4-3

Background Concentrations of Metals in Soil[a]
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Criterion [c]
Aluminum	12 / 12	3520 - 15500	NA	L	8.43E+03	2.69E+04	1.55E+04
Antimony	9 / 25	5.9 - 9.3	5.4 - 74	NP	4.68E+00	NA	9.30E+00
Arsenic	23 / 26	2.1 - 36.5	1.2 - 3.7	L	1.08E+01	7.10E+01	3.65E+01
Barium	9 / 12	35.6 - 826	23.2 - 24.7	L	1.16E+02	1.30E+03	8.26E+02
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00E+00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	NA	L	1.13E+04	2.18E+05	5.23E+04
Chromium	25 / 26	4.4 - 29	12.3 - 12.3	NP	1.34E+01	NA	2.90E+01
Cobalt	9 / 12	9.6 - 116	5.8 - 6.2	L	2.26E+01	2.48E+02	1.16E+02
Copper	23 / 26	2.3 - 56.2	2.2 - 2.9	L	1.70E+01	1.47E+02	5.62E+01
Iron	12 / 12	5880 - 234000	NA	L	4.01E+04	3.58E+05	2.34E+05
Lead	26 / 26	1.9 - 48.6	NA	L	1.28E+01	5.13E+01	4.86E+01
Magnesium	12 / 12	629 - 10400	NA	L	3.26E+03	3.08E+04	1.04E+04
Manganese	26 / 26	21 - 13300	NA	L	7.29E+02	3.51E+03	3.51E+03
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	8.50E-02
Nickel	26 / 26	5.4 - 55.1	NA	L	2.28E+01	7.79E+01	5.51E+01
Potassium	11 / 12	579 - 3390	617 - 617	L	1.24E+03	6.08E+03	3.39E+03
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00E+00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	1.11E+01
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30E+00
Vanadium	11 / 12	9 - 40.9	61.7 - 61.7	L	2.48E+01	8.31E+01	4.09E+01
Zinc	26 / 26	6.6 - 655	NA	L	7.30E+01	3.22E+02	3.22E+02

mg/kg = milligrams per kilogram
NA = Not applicable; not available.

[a] Data used to determine soil background are based on sampling from IT, 1998, ***Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio.***

[b] 95% UTL = 95% upper tolerance limit calculated as described in Section 2.1.4 and rounded to 3 significant figures.

[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used.

Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Table 5-1

Observances of Hydrocarbon in Bedrock During Borehole Coring at PBOW (1941-2009)
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
TPCB-1 (Boring)	6/9/1941	Behind Water Clarification Bldg 416	3	Unknown	85	336.8	Gas 58-60;Oil intermittently	Unknown	
BED-MW22 (Well)	8/24/01-9/10/01	Downgradient Boundary, North of Reactor Area	19.5	19.5	19.5	43	20-24.5	40-43	
BED-MW23 (Well)	8/25/01-9/6/01	South of Reactor Area and Pentolite Road	26.3	26.3	26.3	74	30-74	33-74	Hydrocarbon observed seepng from rock core.
BED-MW24 (Well)	8/26/01-9/13/01	West of West Red Water Ponds, Downgradient	17.3	17.3	17.3	41.5	26.5-40.0	31.5-41.5	Hydrocarbon observed seepng from rock core. Gas discharge (gurgling) heard during water recharge.
BED-MW27 (Well) (Abandoned)	8/23/01-9/8/01	Downgradient Boundary, East-Northeast of Reactor Area	18.8	18.8	20	105	95-105	41-105	Hydrocarbon observed seepng from rock core. Well abandoned due to excessive (nuisance) hydrogen sulfide odors.
TNTA-BEDGW-001 (Well)	9/24/01-9/13/01	TNT Area A, Near Maintenance and Short Cut Rd, At Former Bldg 146	8.5	25	51	86	None	68-85	A thickness of approx. 3.5 feet free-phase hydrocarbon was encountered prior to sampling (10/9/01).
BED-MW30 (Well)	3/15/04-3/19/04	Near Bouy Road and Patten Tract Intersection, Outside (west) PBOW Boundaries	24	24	24	58.3	31-58.3	34.5-35.7; 38.8-39.1; 39.5-49.5;	
BED-MW31 (Boring)	3/16/04-3/20/04	At former RR bed, West of Schenk Rd, Outside (downgradient) of PBOW Boundaries	13	14.5	13.8	90.2	17.5-90.2	20-30; 31.1; 40.1-21; 87.1-90.2	
BED-MW32 (Boring)	3/29/04-4/1/04	East of Columbus Rd, Between east and west bound lanes of Route 2; Outside (downgradient) of PBOW Boundaries	17.5	17.5	17.5	90.1	17.5-55.1	29-29.5; 30-40;	

Table 5-1

Observances of Hydrocarbon in Bedrock During Borehole Coring at PBOW (1941-2009)
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
BED-MW33 (Well)	3/30/04-4/2/04	Columbus Park, Northeast of facility; Outside (downgradeint) of PBOW Boundaries	15	15	15	89.5	20-39.5	38-39.5; 85.3-89	
BED-MW34 (Boring)	3/17/04-3/22/04	NASA's Old Sewage Water Treatment Plant Area; Outside (downgradient) of main PBOW facility	19	20	35.5	90.1	20-90.1	41.5-90.1	Core section very heavily stained. Heard gas "burping" in borehole 66.1-71.1'. Free-phase hydrocarbon on water (0.3 to 0.8'), prior to abandonment.
1SLA-BEDGW-001	2/26/09 - 3/6/09	TNTA Sewer line area, north of Maintenance Rd. and Short Cut Rd.	17.9	24.2	40.2	58.2	None	52.8 - 58.2	11-9-09 - Well gauging detected 0.08' product on water.
1SLA-BEDGW-002	2/26/09 - 3/4/09	TNTA Sewer line area, north of Maintenance Rd. and Short Cut Rd.	11.2	39	43.8	75.2	50 - 65	None	After setting well, strong hydrocarbon/H2S odors detected in vicinity of well until water level becoame static.
AP1-BEDGW-001	3/13/09 - 3/18/09	AP1 area south of Maintenance Rd., in grass north of white block building.	25.5	44.8	44.6	81.3	57.5 - 81.3	57.5 - 66.0 seeping from rock	11-6-09 - Well gauging detected 0.9' product on water.

Table 5-1

Observances of Hydrocarbon in Bedrock During Borehole Coring at PBOW (1941-2009)
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
AP1-BEDGW-002	3/15/09 - 3/29/09	AP1 area immediately south of Maintenance Rd. in grass.	21.4	40	39.5	61.3	None	None	Well emits H2S when cap is removed.
AP2-BEDGW-002	4/2/09 - 4/17/09	AP2 west of Campbell Rd.	15.8	21.1	15.8	86.1	None	47.1 seeping from coral, 69.5 seeping from rock	
LBA-BEDGW-002	3/25/09 - 3/30/09	LBA area southeast corner of building.	27	37	37.9	71.1	None	49.6 - 56.4	11-4-09 - Well gauging indicated 0.9' product on water.
RCA-BEDGW-001	3/18/09 - 3/29/09	RCA area north of Maintenance Rd. in grass.	23.2	41.6	41.2	81.5	None	53.8 - 70.2	
RCA-BEDGW-002	3/17/09 - 3/29/09	RCA area north of Maintenance Rd. in thicket.	26	37.3	37.3	66	None	57.0 - 58.2	11-3-09 - Sheen noted on water during well gauging, not detectable with interface probe.

Table 5-1

Observances of Hydrocarbon in Bedrock During Borehole Coring at PBOW (1941-2009)
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
RCA- BEDGW-003	3/19/09 - 3/29/09	RCA area north of Maintenance Rd. north of creek.	24.8	35.5	35.5	105.8	None	63.7 - 80.2	
WTP1-BEDGW-003	3/3/09 - 3/14/09	WTP1 north of the intersection of Maintenance Rd and Taylor Rd.	21.2	37.95	38.5	61.5	None	49.9 - 55.8	
WTP3-BEDGW-001	3/27/09 - 4/1/09	WTP3 on east side of gravel drive.	24	33	30	53.1	None	40.4 - 53.1	Well emits H2S when cap is removed.
WTP3-BEDGW-002	3/28/09 - 4/14/09	WTP3 in berm north of building	25	33	30	53.4	None	43.4 - 47.8	Well emits H2S when cap is removed.

Table 5-1

Observances of Hydrocarbon in Bedrock During Borehole Coring at PBOW (1941-2009)
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Borehole Identification	Date Drilled	Location	Depth to Bedrock (ft)	Depth to Bedrock (refusal - ft)	Depth to Delaware Limestone[a] (ft)	Depth Drilled (ft)	Hydrocarbon/H_2S Odor Detected[b] (ft)	Hydrocarbon Stained Core[c] (ft)	Comments
WTP3-BEDGW-003	3/29/09 - 4/14/09	WTP3 west of creek.	25.8	33.3	30	52.9	None	40.2 - 52.9	

Notes

[a] Limestone unit interpretations from Regional Geologic Map, 2004 Groundwater Data Summary and Evaluation Report (Shaw, 2005).

[b] A hydrocarbon odor was detected by the olfactory senses. PID readings in the breathing air remained below action levels.

[c] Hydrocarbon staining on the rock core is also seen in photographs (Appendix C).

A hydrocarbon thickness of 0.05 feet was measured in well BED-MW16 on 10/3/01.

A hydrocarbon thickness of 0.63 feet was measured in well AA1-BEDGW-001 on 10/4/01.

ft - Feet.

NASA - National Aeronautics and Space Administration.

PBOW - Plum Brook Ordnance Works.

TNT - Trinitrotoluene.

Identifies borehole/monitoring well from Ash Pit 1.

Table 5-2

Summary of Groundwater Level Measurements
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Piezometer/Well Identification	Coordinates (Ohio Plane)[a] Northing (y)	Easting (x)	Top of Casing Elevation[a] (ft msl)	Ground Elevation[a] (ft msl)	Groundwater Elevation Measurements (feet above mean sea level [msl]) 26-May-09 DTW	26-May-09 Elevation	27-Oct-09 DTW	27-Oct-09 Elevation
Temporary Piezometer								
PZ01	623,724.22	1,918,737.52	637.65	636.8	8.78	628.87	Abandoned[b]	--
PZ02	623,728.76	1,918,855.35	639.11	637.7	7.28	631.83	Abandoned[b]	--
PZ03	623,715.50	1,919,025.14	640.79	638.7	7.08	633.71	Abandoned[b]	--
PZ04	623,368.95	1,918,792.10	641.23	640.9	4.75	636.48	Abandoned[b]	--
PZ05	623,521.04	1,918,801.67	638.30	637.5	4.4	633.90	Abandoned[b]	--
PZ06	623,585.48	1,918,735.41	635.15	634.5	1.25	633.90	Abandoned[b]	--
Overburden/Shale Monitoring Well								
AP1-MW01	623372.09	1918800.20	642.93	640.30	6.52	636.41	8.23	634.70
AP1-MW02	623622.45	1918730.13	638.01	634.70	5.21	632.80	7.21	630.80
AP1-MW03	623723.44	1918747.06	639.06	636.50	10.36	628.70	13.91	625.15
Delaware Limestone Monitoring Well								
AP1-BEDGW-001	623369.01	1918892.38	644.28	641.80	76.39	584.76[c]	45.13	599.15[c]
AP1-BEDGW-002	623620.90	1918741.22	637.16	634.50	43.06	594.10	40.66	596.50

Notes:

DTW - Depth-to-Water

[a]Northings and Eastings are scaled to the Ohio State Plane Coordinate System (North Zone), NAD 1983. Vertical datum to NGVD 1929.

[b]Piezometers were abandoned July 2009.

[c]Water level elevation has been corrected for hydrocarbon; Top-of-casing elevation - (depth-to-water - [0.75 x thickness]).
0.90 feet of weathered petroleum present on 27 October 2009.

Table 5-3

Well Pair Vertical Hydraulic Gradients
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Well Name	Unit Monitored (ft bgs)	Well TD (ft bgs)	Depth of Monitored Zone (ft bgs)	Elevation of Ground Surface (ft)	Elevation of Center of Monitored Zone (ft)	Groundwater Elevation			Average Vertical Gradient (ft/ft)
							5/6/2009	5/26/2009	11/9/2009	
Pair 1	1SLA-MW02	OB/OS	28.75	13.4-28.4	630.8	609.90	620.7	625.88	629.38	
	1SLA-BEDGW-002	DL	74.6	64.2-74.2	630.9	561.70	Not measured	587.22	587.61	
	Distance between Center of Monitored Zones					48.20				
	Vertical Gradient						NA	0.802	0.867	0.834
Pair 2	AP1-MW02	OB/OLS	19.55	9.2-19.2	634.7	620.50	633.81	632.8	630.8	
	AP1-BEDGW-002	DL	59.35	44.0-59.0	634.5	583.00	599.63	594.1	596.5	
	Distance between Center of Monitored Zones					37.50				
	Vertical Gradient						0.911	1.032	0.915	0.953
Pair 3	AP2-MW02	OB	15.35	5.0-15.0	632.5	622.50	NA	628.44	621.45	
	AP2-BEDGW-002	DL	85.35	70.0-85.0	632.4	554.90	NA	612.56	607.45	
	Distance between Center of Monitored Zones					67.60				
	Vertical Gradient						NA	0.235	0.207	0.221
Pair 4	LBA-MW01	OB/OS	16.35	6.0-16.0	637.2	626.20	633.74	632.66	629.58	
	LBA-BEDGW-001	DL	100.35	85.0-100.0	637.3	544.80	538.44	538.15	541.56	
	Distance between Center of Monitored Zones					81.40				
	Vertical Gradient						1.171	1.161	1.081	1.138
Pair 5	LBA-MW-2	OB/OS	16.35	6.0-16.0	635.9	624.90	631.63	631.19	630.85	
	LBA-BEDGW-002	DL	70.35	55.0-70.0	636.30	573.80	573.03	567.58	574.38	
	Distance between Center of Monitored Zones					51.10				
	Vertical Gradient						1.147	1.245	1.105	1.166
Pair 6	RCA-MW01	OB/OS	9.35	4.0-9.0	638.4	631.90	634.1	633.21	629.99	
	RCA-BEDGW-001	DL	80.35	65.0-80.0	638.50	566.00	562.8	560.78	565.2	
	Distance between Center of Monitored Zones					65.90				
	Vertical Gradient						1.082	1.099	0.983	1.055
Pair 7	RCA-MW02	OB/OS	28.05	17.70-27.70	635.3	612.60	633.51	630.03	624.25	
	RCA-BEDGW-002	DL	65.35	50.0-65.0	635.50	578.00	583	599.31	597.89	
	Distance between Center of Monitored Zones					34.60				
	Vertical Gradient						1.460	0.888	0.762	1.037
	WTP1-MW02	OB/OS	16.3	6.0-16.0	638.6	627.60	636.42	634.09	631.07	

Table 5-3

Well Pair Vertical Hydraulic Gradients
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Well Name	Unit Monitored (ft bgs)	Well TD (ft bgs)	Depth of Monitored Zone (ft bgs)	Elevation of Ground Surface (ft)	Elevation of Center of Monitored Zone (ft)	Groundwater Elevation			Average Vertical Gradient (ft/ft)
							5/6/2009	5/26/2009	11/9/2009	
Pair 8	WTP1-BEDGW-002	DL	53.35	43.0-53.0	637.80	589.80	601.8	603.75	616.51	
	Distance between Center of Monitored Zones					37.80				
	Vertical Gradient						0.916	0.803	0.385	0.701
Pair 9	WTP1-MW03	OB/OS	16.3	6.0-16.0	637	626.00	635.63	633.52	630.7	
	WTP1-BEDGW-003	DL	55.35	45.0-55.0	637.10	587.10	600.74	599.29	600.85	
	Distance between Center of Monitored Zones					38.90				
	Vertical Gradient						0.897	0.880	0.767	0.848
Pair 10	WTP3-MW01	OB/OS	18.35	8.0-18.0	637	624.00	633.89	Not measured	626.07	
	WTP3-BEDGW-001	DL	52.35	37.0-52.0	637.10	592.60	603.05	Not measured	603.98	
	Distance between Center of Monitored Zones					31.40				
	Vertical Gradient						0.982	NA	0.704	0.843
Pair 11	WTP3-MW02	OB/OS	18.35	8.0-18.0	637.7	624.70	632.68	Not measured	628.97	
	WTP3-BEDGW-002	DL	52.35	37.0-52.0	637.60	593.10	603.64	Not measured	603.95	
	Distance between Center of Monitored Zones					31.60				
	Vertical Gradient						0.919	NA	0.792	0.855

A negative vertical gradient indicates an upward gradient.
A positive vertical gradient indicates a downward gradient.
bgs - Below ground surface.
ft - Feet.
OB - Overburden.
OS - Ohio Shale.
DL - Delaware limestone.
OLS - Olentangy shale.
Identifies monitoring wells of Ash Pit 1.

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB01						ASH PIT 1-SB02						ASH PIT 1-SB03					
				SAMPLE NO	AP0001		AP0002		AP0003		AP0004		AP0005		AP0006		AP0007		AP0008		AP0009	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	_5 - 1_5 Ft		3_5 - 5_5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 3_8 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																						
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																						
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	0.0477	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	0.0378	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																						
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	-	-			-	-					-	-	-	-		
METALS																						
Aluminum	mg/kg	7,700	15,500	13000	6,190	J	9,230	J	8,980	J	9,360	J	8,380	J	7,780	J	9,940		2,770		8,470	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.258	J	-	-	-	-	0.294	J	-	-	0.347	J	-	-	0.267	J
Arsenic	mg/kg	0.39	36.5	60.8	6.7	J	8.3	J	4.54	J	9.14	J	6.17	J	4.3	J	13.2		5.62		6.7	
Barium	mg/kg	1,500	826	451	32.7	J	37.7	J	51.5	J	83.3	J	35.9	J	56.1	J	107		13		46.7	
Beryllium	mg/kg	16	1	16.5	**5.74**	J	**4.87**	J	**5.82**	J	**10.8**	J	**5.99**	J	**5.23**	J	**13.9**	J	**3.62**	J	**5.49**	J
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	-	-	0.345	J	-	-	-	-	-	-	0.277	J
Calcium	mg/kg	NE	52,300	54300	14,400		35,200		50,900		18,800		46,600		45,700		9,390		26,700		48,600	
Chromium	mg/kg	0.29	29	19.5	10.6		13.9		13.4		12.4		11.9		11.5		13.6		5.51		11.7	
Cobalt	mg/kg	2.3	116	62.2	5.47		6.18		9.22		8.57		9.76		8.14		9.92		3.23		8.43	
Copper	mg/kg	310	56.2	124	15.4	J	25.4	J	27.6	J	27.3	J	37.7	J	24.4	J	30.5		7.71		27.3	
Iron	mg/kg	5,500	234,000	90300	17,200		15,600		20,200		36,500		21,500		18,000		63,100		10,600		18,900	
Lead	mg/kg	400	48.6	28.8	6.61		12.3		10.9		9.65		14.6		11.4		9.59		7.75		12.3	
Magnesium	mg/kg	NE	10,400	20100	5,030		**13,700**		**18,600**		5,830		**16,500**		**20,100**		1,500		6,420		**17,100**	
Manganese	mg/kg	180	3,506	4470	263		251		524		306		543		472		252		266		470	
Mercury	mg/kg	2.3	0.09	0.383	-	-	-	-	0.0162	J	0.0357		0.0196	J	0.0159	J	**0.0928**		-	-	0.0151	J
Nickel	mg/kg	150	55.1	43.4	3.93	J	13.3	J	16.9	J	-	-	18.7	J	15	J	-	-	1.71		14.7	
Potassium	mg/kg	NE	3,390	2440	577	J	1,130	J	1,270	J	1,190	J	1,110	J	1,080	J	1,260		299		1,070	
Selenium	mg/kg	39	2	3.3	-	-	-	-	-	-	0.618	J	-	-	-	-	0.567	J	-	-	-	-
Sodium	mg/kg	NE	NE	658	57.6		96		151		114		131		137		96.8		61.3		132	
Thallium	mg/kg	NE	1.3	3	-	-	0.366	J	0.271	J	-	-	0.343	J	-	-	0.563		-	-	0.301	J
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.3	J	20.9	J	26.3	J	20.6	J	20.3	J	29.9	J	15.1	J	20.5	J
Zinc	mg/kg	2,300	321.75	92.4	44.4		57.1		58.7		55.2		72.7		55.4		57.1		23.1		54.1	
GENERAL CHEMISTRY																						
Total organic carbon	mg/kg	NE	NE	55.3	55.3	J																

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB04										ASH PIT 1-SB05					
				SAMPLE NO	AP0010		AP0011		AP0012		AP0062		AP0013		AP0014		AP0015		AP0016	
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	0 - 1 Ft		3 - 4 Ft		3 - 4 Ft		3 - 4 Ft		8 - 10 Ft		0 - 1 Ft		3 - 3_7 Ft		8 - 9 Ft	
				SAMPLE PURPOSE	REG		REG		FD		FS		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	0.942	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.0661	J	-	-	-	-	-	-	-	-	0.764	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.055	J	-	-	-	-	-	-	-	-	0.275	J	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101			-	-	-	-	-	-			-	-	-	-		
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	12,700		7,340		6,910		6,680		10,200		10,700		6,260		8,810	
Antimony	mg/kg	3.1	9.3	1.3	0.352	J	-	-	-	-	-	-	0.304	J	0.416	J	-	-	0.276	J
Arsenic	mg/kg	0.39	36.5	60.8	11.7		3.72		3.42		6.2		8.59		9.06		11.6		5.78	
Barium	mg/kg	1,500	826	451	105		52.8		132		42.8		451		82.7		168		45.5	
Beryllium	mg/kg	16	1	16.5	**16.5**	J	**6.43**	J	**8.18**	J	-	-	-	-	**13.6**	J	**12.9**	J	**7**	J
Cadmium	mg/kg	7	NE	7.66	-	-	0.25	J	0.313	J	-	-	0.276	J	-	-	0.269	J	-	-
Calcium	mg/kg	NE	52,300	54300	3,330		2,570		2,790		2,300		2,300		35,100		2,960		36,000	
Chromium	mg/kg	0.29	29	19.5	12		11.7		11.5		11		17.7		16.4		13.5		13.7	
Cobalt	mg/kg	2.3	116	62.2	8.92		26.8		28.9		27.4		62.2		8.36		20.5		10.3	
Copper	mg/kg	310	56.2	124	50		9.5		11.3		7.9		30.7		47.9		10.4		29.2	
Iron	mg/kg	5,500	234,000	90300	90,300		18,700		27,400		21,900		32,800		64,800		62,000		23,600	
Lead	mg/kg	400	48.6	28.8	11.3		7.25		8.13		6.8		19.2		12.3		5.69		12	
Magnesium	mg/kg	NE	10,400	20100	782		1,150		1,020		1,140		3,480		4,010		961		**15,600**	
Manganese	mg/kg	180	3,506	4470	241		871		1,240		556		**4,470**		305		954		484	
Mercury	mg/kg	2.3	0.09	0.383	**0.383**		0.0305		0.0301		-	-	0.0195	J	0.0756		0.0592		0.0222	J
Nickel	mg/kg	150	55.1	43.4	-	-	14.4		8.92		27.9		43.4		-	-	-	-	16.1	
Potassium	mg/kg	NE	3,390	2440	1,280		298		281		-	-	948		1,160		164		1,110	
Selenium	mg/kg	39	2	3.3	0.6	J	-	-	-	-	-	-	-	-	0.592	J	-	-	0.984	U
Sodium	mg/kg	NE	NE	658	119		26		24		-	-	45.9		165		34.9		107	
Thallium	mg/kg	NE	1.3	3	0.356	J	-	-	-	-	-	-	0.354	J	0.303	J	-	-	0.405	J
Vanadium	mg/kg	39	40.9	37.6	32.4	J	22	J	26.1	J	20.5		29.3	J	27.9	J	37.6	J	24.2	J
Zinc	mg/kg	2,300	321.75	92.4	55.3		63.4		75.1		60.7		87		62.8		92.4		65.4	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB06						ASH PIT 1-SB08									
				SAMPLE NO	AP0017		AP0018		AP0019		AP0023		AP0024		AP0025		AP0063		AP0057	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08	
				DEPTH	_8 - 1_8 Ft		5 - 5_8 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	0.31	J	-	-	-	-	0.247	J	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	0.231	J	-	-	-	-	0.2	J	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	1.02	J	0.0642	J	-	-	0.691	J	0.58	
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	0.839	J	0.0534	J	-	-	0.603	J	0.55	
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	1.34	J	0.0829	J	-	-	1.07	J	0.77	
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	0.989	J	0.0675	J	-	-	0.711	J	0.58	
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	2.06	J	0.126	J	-	-	1.69	J	1.3	
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	1.95	J	0.312	J	-	-	1.68	J	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	0.299	J	0.0553	J	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	0.796	J	0.075	J	-	-	0.866	J	0.51	
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	1.5	J	0.102	J	-	-	1.14	J	0.96	
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	-	-			0.101	J	-	-			-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	10,500	J	13,000	J	8,870	J	7,200		6,700	J	11,700		7,910		9,080	
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	0.287	J	0.897		0.348	J	0.26	J	0.779		-	-
Arsenic	mg/kg	0.39	36.5	60.8	6.4	J	7.53	J	10.4	J	10.7		9.98	J	5.65		11.2		12.6	
Barium	mg/kg	1,500	826	451	62.6	J	73.6	J	32.6	J	89.5		109		42.3		79.3		76.5	
Beryllium	mg/kg	16	1	16.5	**11.5**	J	**6.55**	J	**6.71**	J	**12**	J	**11.5**	J	**7.18**	J	**10.2**	J	-	-
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	7.66		0.279	J	-	-	-	-	-	-	0.82	
Calcium	mg/kg	NE	52,300	54300	4,580		37,800		39,300		10,800		5,380	J	40,400		14,000		9,820	
Chromium	mg/kg	0.29	29	19.5	14.6		19.5		13.4		10.8		8.34		17		15.2		11.6	
Cobalt	mg/kg	2.3	116	62.2	10.1		10.1		11.2		7.28		5.37		10.1		6.15		6.7	
Copper	mg/kg	310	56.2	124	20.5	J	27	J	32.7	J	30.7		21.3		28.4		33.1		30.7	
Iron	mg/kg	5,500	234,000	90300	41,100		22,600		23,000		45,900		47,000		24,400		47,100		44,200	
Lead	mg/kg	400	48.6	28.8	8.3		12.2		13.1		28.8		9.36		13.6		25.3		19.6	
Magnesium	mg/kg	NE	10,400	20100	1,730		**11,700**		**11,600**		1,510		839		**12,100**		2,320		1,600	
Manganese	mg/kg	180	3,506	4470	199		701		373		343		469		347		341		254	
Mercury	mg/kg	2.3	0.09	0.383	0.0146	J	-	-	0.0148	J	**0.163**		0.0516		-	-	**0.151**		**0.16**	
Nickel	mg/kg	150	55.1	43.4	-	-	23.7	J	21.2	J	-	-	-	-	18.8		-	-	16.8	
Potassium	mg/kg	NE	3,390	2440	643	J	1,580	J	1,260	J	678		559		1,370		630		875	
Selenium	mg/kg	39	2	3.3	-	-	-	-	0.761	J	0.512	J	0.559	J	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	658	70.4		117		118		65.3	J	87.4		98.5		113	J	-	-
Thallium	mg/kg	NE	1.3	3	-	-	0.239	J	0.663		0.292	J	0.275	J	0.333	J	0.256	J	-	-
Vanadium	mg/kg	39	40.9	37.6	28.2	J	24.3	J	17	J	23.8	J	18.9	J	25.3	J	19.9	J	18.4	
Zinc	mg/kg	2,300	321.75	92.4	85.4		67.2		78		69.1		38.1		63.6		57.7		47.4	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 1-SB09										ASH PIT 3-SB01				ASH PIT 3-SB02			
				SAMPLE NO	AP0026		AP0027		AP0028		AP0058		AP0061		AP0032		AP0033		AP0036		AP0037	
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		19-Aug-09		19-Aug-09		19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		3 - 4 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		0 - 1 Ft		1.2 - 2.3 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FD		FS		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																						
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	-	-	0.0563	J	-	-	-	-	0.0512	J
SEMIVOLATILES																						
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	0.0516	J	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	0.156	J	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	0.168	J	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	0.268		-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	0.0882	J	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	0.0972	J	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	0.19	J	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	0.0757	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-	0.401		-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	0.0914	J	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.363	QJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.247	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.156	J	-	-	0.0778	J	0.0887	J	-	-	0.107	J	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-	0.273		-	-	-	-	-	-
PCBs																						
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-									0.015	J	-	-	-	-	-	-
METALS																						
Aluminum	mg/kg	7,700	15,500	13000	7,650	J	7,640	J	8,650	J	8,130	J	10,700		5,060	J	7,010	J	7,580	J	10,400	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	12.6	J	5.13	J	9.16	J	9.95	J	8.2		7.7		5		4.9		12.9	
Barium	mg/kg	1,500	826	451	84.9	J	39	J	41.1	J	37.6	J	73.9		59		41.2		48.1		85.7	
Beryllium	mg/kg	16	1	16.5	**8.94**	J	**5.85**	J	**7.08**	J	**6.73**	J	-	-	0.69		0.5		0.57		**1.5**	
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	-	-	-	-	0.33		0.18	J	-	-	-	-
Calcium	mg/kg	NE	52,300	54300	15,600		46,200		37,700		39,800		50,200		8,460	J	49,300	J	11,700	J	9,690	J
Chromium	mg/kg	0.29	29	19.5	10.7		11.7		13.5		12		17		8.8	J	10.3	J	11	J	14.9	J
Cobalt	mg/kg	2.3	116	62.2	6.2		8.95		10.7		10.3		10.8		4.5	J	6.7	J	5.7	J	6.3	J
Copper	mg/kg	310	56.2	124	18.2	J	26.6	J	30.1	J	31.4	J	23.1		**124**		18.4		11.6		16.2	
Iron	mg/kg	5,500	234,000	90300	26,500		20,600		24,200		24,200		24,100		12,400	J	14,500	J	13,300	J	24,700	J
Lead	mg/kg	400	48.6	28.8	6.28		9		12.3		11.5		9.2		16.5		9.3	J	9.7		3.4	J
Magnesium	mg/kg	NE	10,400	20100	3,740		**16,100**		10,300		**10,400**		**15,000**		2,640	J	**16,600**	J	5,000	J	891	J
Manganese	mg/kg	180	3,506	4470	2,810		506		433		473		431		99.2	J	410	J	353	J	120	J
Mercury	mg/kg	2.3	0.09	0.383	0.0383		0.0124	J	0.0142	J	0.0146	J	-	-	**0.15**		0.015	J	0.047	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	13.5	J	17.1	J	17.2	J	27.8		13		17.1		13.6		13.4	
Potassium	mg/kg	NE	3,390	2440	1,040	J	1,010	J	1,270	J	1,180	J	2,440		524	J	1,970	J	818	J	1,570	J
Selenium	mg/kg	39	2	3.3	-	-	-	-	-	-	-	-	-	-	1.1	J	0.84	J	0.59	J	**2.2**	J
Sodium	mg/kg	NE	NE	658	161		111		149		156		-	-	238	J	293	J	196	J	640	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	0.349	J	0.446	J	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.1	J	16.4	J	16.6	J	19.6		14.1		16.3		19.3		24.3	
Zinc	mg/kg	2,300	321.75	92.4	34.8		63.3		82.4		68.6		57.6		70.5	J	44.7	J	40.4	J	30.5	J
GENERAL CHEMISTRY																						
Total organic carbon	mg/kg	NE	NE	55.3																		

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 3-SB03		ASH PIT 3-SB04				ASH PIT 3-SB05				ASH PIT 3-SB06					
				SAMPLE NO	AP0039		AP0042		AP0043		AP0045		AP0046		AP0048		AP0049		AP0061A	
				SAMPLE DATE	19-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		20-Aug-09		20-Aug-09		20-Aug-09	
				DEPTH	0.2 - 1.7 Ft		0.3 - 0.8 Ft		0.8 - 1.5 Ft		0.3 - 1.0 Ft		1 - 2 Ft		0.2 - 1 Ft		1 - 2 Ft		2 - 2_7 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	0.0562	J	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	0.043	J	-	-	-	-	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	8,820	J	8,240		4,870		9,350		6,010		8,770		11,400		7,840	
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	-	-	0.67	J	1.2	J	1.3	J	0.93	J
Arsenic	mg/kg	0.39	36.5	60.8	12.4		29		8.5		13.7		20.3		12.7		16.7		30.6	
Barium	mg/kg	1,500	826	451	90.7		127		41.5		82.2		63.7		203		113		65.1	
Beryllium	mg/kg	16	1	16.5	**1.7**		**2.1**		0.4		**1.5**		0.47		0.74		0.92		0.56	
Cadmium	mg/kg	7	NE	7.66	-	-	0.3	J	0.2	J	-	-	0.21	J	-	-	-	-	0.17	J
Calcium	mg/kg	NE	52,300	54300	11,200	J	15,900		47,500		12,800		**52,800**		2,060		3,200		46,100	
Chromium	mg/kg	0.29	29	19.5	14.3	J	15.5		7.7		13.6		9.6		9.6		12		11.8	
Cobalt	mg/kg	2.3	116	62.2	6.7	J	8.9		5.9		7.4		5.8		4.5		6.3		8.5	
Copper	mg/kg	310	56.2	124	14.2		43.6		15		19.3		17.5		21.6		26.5		17.6	
Iron	mg/kg	5,500	234,000	90300	20,100	J	24,000		11,200		22,800		16,700		68,300		67,800		20,500	
Lead	mg/kg	400	48.6	28.8	3.9	J	20.4		8.1	J	12.5	J	9.6	J	4.5	J	7	J	10	J
Magnesium	mg/kg	NE	10,400	20100	1,210	J	2,300		**14,900**		1,120		**17,500**		343	J	610		**15,700**	
Manganese	mg/kg	180	3,506	4470	148	J	322		362		339		432		54.5		81.7		402	
Mercury	mg/kg	2.3	0.09	0.383	0.036	J	**0.13**	J	0.014	J	-	-	0.03	J	-	-	0.037	J	0.016	J
Nickel	mg/kg	150	55.1	43.4	15.1		22.9		14.3		17.2		16.4		11.5		16		18.8	
Potassium	mg/kg	NE	3,390	2440	1,290	J	1,060	J	1,290		1,110	J	1,490		923		1,380		1,900	
Selenium	mg/kg	39	2	3.3	1.9	J	**2.9**	J	1.1	J	1.7	J	1.1	J	1.4	J	1.5	J	**2.1**	J
Sodium	mg/kg	NE	NE	658	570	J	510	J	224	J	531	J	261	J	493	J	634	J	300	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	-	-	-	-	**3**		**2.9**		-	-
Vanadium	mg/kg	39	40.9	37.6	23.2		28.4		13.3		23.7		15.5		15.1		19.5		17.7	
Zinc	mg/kg	2,300	321.75	92.4	15.9	J	68.3		37		66.3		41.6		17.2		31.3		49.3	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	ASH PIT 3-SB07								ASH PIT 3-SB08							
				SAMPLE NO	AP0051		AP0052		AP0059		AP0060		AP0054		AP0056		AP0057A		AP0055	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0 - 1 Ft		1 - 2 Ft		1 - 2 Ft		1 - 2 Ft		0.3 - 1 Ft		0.3 - 1 Ft		0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG		FD		FS		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																				
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-	-	-	0.0547	J	0.0776	J	-	-	-	-
SEMIVOLATILES																				
Acenaphthylene	mg/kg	NE	NE	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	1,700	NE	0.231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	2.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs																				
Aroclor 1260	mg/kg	0.22	NE	0.101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7,700	15,500	13000	4,760		9,910		9,620		8,630		7,540		10,400		9,390		8,970	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.72	J	-	-	-	-	-	-	0.88	J	-	-	0.5	J
Arsenic	mg/kg	0.39	36.5	60.8	7.7		9.3		6.9		7		27.3		**60.8**		35.2		32.7	
Barium	mg/kg	1,500	826	451	38.5		70.5		70.1		77.2		83.5		110		93.6		98.4	
Beryllium	mg/kg	16	1	16.5	0.41	J	0.67		0.63		-	-	**1.6**		**2**		-	-	0.64	
Cadmium	mg/kg	7	NE	7.66	0.44		0.21	J	0.19	J	-	-	-	-	-	-	-	-	0.14	J
Calcium	mg/kg	NE	52,300	54300	14,100		42,400		47,800		**54,300**		17,700		14,900		14,800		28,000	
Chromium	mg/kg	0.29	29	19.5	6.9		15		14.5		14.8		14.3		18.8		17.5		12.6	
Cobalt	mg/kg	2.3	116	62.2	5		8.1		7.3		8.4		7.6		8.1		-	-	12.2	
Copper	mg/kg	310	56.2	124	38.9		21.7		19.4		15.4		20.5		27.6		29.1		20.9	
Iron	mg/kg	5,500	234,000	90300	15,200		17,700		14,900		17,500		28,400		50,200		38,300		28,300	
Lead	mg/kg	400	48.6	28.8	12.2		11.9	J	11.2	J	9.5		6.7	J	9.8	J	12.2		8.6	
Magnesium	mg/kg	NE	10,400	20100	3,130		**15,800**		**17,500**		**19,400**		1,590		2,110		1,720		**12,400**	
Manganese	mg/kg	180	3,506	4470	217		477		460		498		280		253		282		1,270	
Mercury	mg/kg	2.3	0.09	0.383	0.066	J	0.026	J	0.022	J	-	-	0.079	J	0.071	J	-	-	0.029	J
Nickel	mg/kg	150	55.1	43.4	13.1		22.7		21.4		20.5		17.9		20.7		28.5		31.9	
Potassium	mg/kg	NE	3,390	2440	634	J	2,110		2,110		1,770		948	J	1,280	J	-	-	1,400	
Selenium	mg/kg	39	2	3.3	1.6	J	0.9	J	0.98	J	-	-	**2.2**	J	**3.3**	J	**2.5**		0.66	J
Sodium	mg/kg	NE	NE	658	168	J	269	J	280	J	-	-	470	J	658	J	-	-	324	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	**2.7**		-	-	-	-	-	-	0.5	J
Vanadium	mg/kg	39	40.9	37.6	10.7		21.9		21.1		19.7		24.3		33.5		27.4		20.3	
Zinc	mg/kg	2,300	321.75	92.4	78.7		53.2		49.5		59.3		27.2		40.8		43.3		50.6	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	55.3																

Table 5-4

Detected Constituents in Surface and Subsurface Soil Samples Above RBSCs and /or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
mg/kg - Milligram per kilpgram.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.
Q - Result calculated from linear regression. The instrument response is less than 20% of the instrument response of the low standard of the calibration curve. Per the analytical method, an instrument response below 20% of the low standard for any particular compound should be reported by the lab as non-detect.

Table 5-5

Detected Constituents in Surface Water Samples Above RBSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP1-SW01		AP1-SW02		AP1-SW03		AP1-SW04	
			SAMPLE NO	AP2007		AP2008		AP2012		AP2013	
			SAMPLE DATE	19-May-09		19-May-09		19-May-09		20-May-09	
			DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
			SAMPLE PURPOSE	REG		REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS											
Aluminum	µg/L	37,000	8,770	83.8	J	31.8	J	31.9	J	8,770	
Arsenic	µg/L	0.045	8.3	-	-	-	-	-	-	8.3	J
Barium	µg/L	7,300	80	36.6	J	33.8	J	31.9	J	80	J
Calcium	µg/L	NE	222,000	145,000		143,000		139,000		222,000	
Chromium	µg/L	0.043	13.9	-	-	-	-	-	-	13.9	
Cobalt	µg/L	11	6.9	-	-	-	-	-	-	6.9	J
Copper	µg/L	1,500	19.2	-	-	-	-	-	-	19.2	J
Iron	µg/L	26,000	15,100	31.1	J	-	-	26.6	J	15,100	
Lead	µg/L	15	15	2.1	J	-	-	2	J	15	
Magnesium	µg/L	NE	36,900	26,200		26,600		26,300		36,900	
Manganese	µg/L	880	836	488		396		247		836	
Nickel	µg/L	730	26.2	-	-	-	-	-	-	26.2	J
Potassium	µg/L	NE	11,800	2,170	J	2,040	J	2,030	J	11,800	
Sodium	µg/L	NE	9,140	6,400	J	7,050	J	6,850	J	9,140	J
Vanadium	µg/L	180	20	-	-	-	-	-	-	20	J
Zinc	µg/L	11,000	93.2	13.2	J	9.6	J	10.8	J	93.2	

RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
"-" - Not Detected.
µg/L - Parts per billion.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.

Table 5-6

Detected Constituents in Sediment Samples Above RBSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

			LOCATION CODE	AP1-SD01		AP1-SD02		AP1-SD03		AP1-SD04		AP3-SD01		AP3-SD02		AP3-SD03	
			SAMPLE NO	AP1007		AP1008		AP1012		AP1013		AP1009		AP1010		AP1011	
			SAMPLE DATE	19-May-09		19-May-09		19-May-09		20-May-09		23-May-09		23-May-09		23-May-09	
			DEPTH	0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft		0 - _5 Ft	
			SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																	
Benzo(a)anthracene	mg/kg	0.15	0.143	-	-	-	-	-	-	0.121	J	0.143	J				
Benzo(a)pyrene	mg/kg	0.015	0.158	-	-	-	-	-	-	0.112	J	0.158	J				
Benzo(b)fluoranthene	mg/kg	0.15	0.24	-	-	-	-	-	-	0.175	J	0.24	J				
Benzo(ghi)perylene	mg/kg	NE	0.101	-	-	-	-	-	-	-	-	0.101	J				
Benzo(k)fluoranthene	mg/kg	1.5	0.0805	-	-	-	-	-	-	-	-	0.0805	J				
Chrysene	mg/kg	15	0.159	-	-	-	-	-	-	0.149	J	0.159	J				
Dibenzofuran	mg/kg	78	0.15	-	-	-	-	-	-	0.15	J	-	-				
Di-n-butyl phthalate	mg/kg	6,100	0.18	-	-	0.18	J	-	-	-	-	-	-				
Fluoranthene	mg/kg	2,300	0.253	-	-	-	-	-	-	0.191	J	0.253	J				
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	0.111	-	-	-	-	-	-	-	-	0.111	J				
Methylnaphthalene, 2-	mg/kg	310	0.616	-	-	-	-	-	-	0.616		-	-				
Naphthalene	mg/kg	36	0.337	-	-	-	-	-	-	0.337	J	-	-				
Phenanthrene	mg/kg	NE	0.306	-	-	-	-	-	-	0.306	J	-	-				
Pyrene	mg/kg	1,700	0.206	-	-	-	-	-	-	0.195	J	0.206	J				
PCBs																	
Aroclor 1254	mg/kg	0.11	0.0352	0.025	J	-	-	-	-	0.0352	J	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	0.113	0.0207	J	-	-	-	-	0.113	J	-	-	-	-	-	-
METALS																	
Aluminum	mg/kg	77,000	9880	9,880		7,130		4,490		9,860		3,610					
Antimony	mg/kg	31	1.3	0.5	J	0.7	J	-	-	1.3	J	0.54	J				
Arsenic	mg/kg	0.39	15.9	7.6		9.3		4		15.9		6.4					
Barium	mg/kg	15,000	110	57.5		35.7		31.3		110		26.6					
Beryllium	mg/kg	160	1.6	0.62		0.5		0.3	J	1.6		0.26	J				
Cadmium	mg/kg	70	0.59	0.55		0.32		0.23	J	0.59		0.3	J				
Calcium	mg/kg	NE	29900	29,900		10,400		16,800		13,700		9,610	J				
Chromium	mg/kg	0.29	16.9	16.9		11.8		7.8		15.6		6.4					
Cobalt	mg/kg	23	9.9	9.9		8.9		4.4		9.1		4.1	J				
Copper	mg/kg	3,100	126	38.5		17.1		10.5		24.5		126					
Iron	mg/kg	55,000	21700	21,700		19,300		9,270		21,400		13,000	J				
Lead	mg/kg	400	23.7	23.7		13		7	J	22.9		8.7	J				
Magnesium	mg/kg	NE	9370	9,370		4,360		4,970		1,810		4,370	J				
Manganese	mg/kg	1,800	1670	446		337		165		1,670		130	J				
Mercury	mg/kg	23	0.14	0.14		0.024	J	0.021	J	0.11	J	0.027	J				
Nickel	mg/kg	1,500	26.7	26.7		21.3		12		25.7		10.5	J				
Potassium	mg/kg	NE	1740	1,740		1,170		725	J	1,340		337	J				
Selenium	mg/kg	390	1.3	0.32	J	0.38	J	-	-	1.3	J	0.54	B				
Silver	mg/kg	390	0.099	0.099	J	-	-	-	-	-	-	-	-				
Sodium	mg/kg	NE	112	112	J	-	-	83.1	J	-	-	-	-				
Vanadium	mg/kg	390	25.5	21.9		19.2		12.4		25.5		11.3					
Zinc	mg/kg	23,000	137	98.9		45.3		33.3		137		52.8	J				
GENERAL CHEMISTRY																	
Total organic carbon	mg/kg	NE	43000	21,000						43,000		28,000					

Sediment samples AP1010 and AP1011 were analyzed only for explosives and PCBs. Since neither contaminants were present, no data is shown.

NE - Not established (RBSCs).
Shaded cell indicates value is greater than RBSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the area of concern ("B" qualified data not included).
"-" - Not Detected.
mg/kg - Parts per million.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.

Table 5-7

Detected Constituents in Temporary Piezometers Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

				LOCATION CODE	ASH PIT 1-PZ01		ASH PIT 1-PZ02		ASH PIT 1-PZ04		ASH PIT 1-PZ04		ASH PIT 1-PZ04		ASH PIT 1-PZ05	
				SAMPLE NO	AP3000		AP3001		AP3003		WW3005		WW3013		AP3004	
				SAMPLE DATE	12-Dec-08		11-Dec-08		15-Dec-08		15-Dec-08		15-Dec-08		15-Dec-08	
				DEPTH	19 - 19 Ft		16 - 16 Ft		20 - 20 Ft		20 - 20 Ft		20 - 20 Ft		20 - 20 Ft	
				SAMPLE PURPOSE	REG		REG		REG		FD		FS		REG	
				LOW-FLOW SAMPLED	Yes		Yes		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																
Amino-2,6-dinitrotoluene, 4-	µg/L	7.3	NE	0.342	-	-	-	-	-	-	-	-	-	-	0.342	J
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	9,740	**9,740**		**3,790**								**2,080**	
Barium	µg/L	730	11,800	90.1	90.1		72.9								41.5	B
Calcium	µg/L	NE	316,000	159,000	124,000		118,000								159,000	
Chromium	µg/L	0.043	NE	11.2	11.2		-	-							-	-
Cobalt	µg/L	1.1	12.1	2.91	-	-	2.91	J							-	-
Copper	µg/L	150	19.8	8.93	8.93	J	8.6	J							-	-
Iron	µg/L	2,600	1,550	7,030	**7,030**		**3,400**								**2,580**	
Lead	µg/L	15	NE	3.2	-	-	3.2	J							-	-
Magnesium	µg/L	NE	217,000	52,700	34,400		33,000								52,700	
Manganese	µg/L	88	636	3,370	71.4		306								**3,370**	
Nickel	µg/L	73	8.6	4.51	4.07	J	4.51	J							-	-
Potassium	µg/L	NE	116,000	9,130	4,270		1,680								9,130	
Sodium	µg/L	NE	1,390,000	11,500	11,500		9,740								59,400	B
Vanadium	µg/L	18	NE	19.4	19.4		8.07								4.24	J
METALS-FILTERED																
Barium	µg/L	730	11,800	37.1	37.1		30.5								32.2	B
Calcium	µg/L	NE	316,000	175,000	131,000		101,000								175,000	
Iron	µg/L	2,600	1,550	--	-	-	-	-							94.7	B
Lead	µg/L	15	NE	10.4	-	-	10.4								-	-
Magnesium	µg/L	NE	217,000	56,600	33,200		27,100								56,600	
Manganese	µg/L	88	636	3,540	10.7		35.2								**3,540**	
Potassium	µg/L	NE	116,000	9,270	898		657								9,270	
Sodium	µg/L	NE	1,390,000	12,000	12,000		11,100								62,500	B
Thallium	µg/L	NE	NE	5.08	-	-	5.08	J							-	-
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	246,000	133,000		172,000								246,000	
Chloride	µg/L	NE	NE	12,100	12,100		3,560									
Hardness	µg/L	NE	NE	614,000	451,000		431,000								614,000	
Hardness	µg/L	NE	NE	671,000	464,000		363,000								671,000	
Nitrate-Nitrite	µg/L	NE	NE	353	97		353								35	J
Sulfate	µg/L	NE	NE	61,700	61,700		39,400									
Total dissolved solids	µg/L	NE	NE	1,000,000	484,000		384,000								1,000,000	
Total suspended solids	µg/L	NE	NE	343,000	161,000		343,000								66,000	
Turbidity	NTU	NE	NE	195	111		195								101	

Table 5-7

Detected Constituents in Temporary Piezometers Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 5-8

Detected Constituents in Overburden/Shale Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-MW01				AP1-MW02				AP1-MW03			
				SAMPLE NO	AP3050		AP3070		AP3051		AP3071		AP3052		AP3072	
				SAMPLE DATE	7-May-09		4-Nov-09		10-May-09		6-Nov-09		11-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	Yes		Yes		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES																
Nitrotoluene, 2-	µg/L	0.31	NE	0.18	-	-	0.18	J	-	-	-	-	-	-	-	-
Nitrotoluene, 4-	µg/L	4.2	NE	0.17	-	-	0.17	J	-	-	-	-	-	-	-	-
VOLATILES																
Chloroform	µg/L	0.19	NE	0.48	0.48	J	-	-	-	-	-	-	-	-	-	-
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	1,110	26.1	J	191	J	76.8	J	68.7	J	**1,110**	J	17.2	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	5.4	J	-	-	-	-	-	-	6.3	J
Barium	µg/L	730	11,800	252	28.6	J	37.8	J	61	J	53.1	J	252		154	J
Calcium	µg/L	NE	316,000	282,000	282,000		194,000		207,000		169,000		93,400		94,300	
Cobalt	µg/L	1.1	12.1	22.2	**22.2**	J	6.8	J	3	J	3.6	J	1	J	2.7	J
Iron	µg/L	2,600	1,550	4,610	**4,610**		**4,410**		-	-	-	-	1,090		-	-
Lead	µg/L	15	NE	4.3	4.3	J	2.6	B	-	-	2	B	2.2	J	2.4	B
Magnesium	µg/L	NE	217,000	92400	77,100		63,200		92,400		74,900		39,100		38,700	
Manganese	µg/L	88	636	32,300	**32,300**		**8,290**		351		436		136		463	
Nickel	µg/L	73	8.6	15.2	**13.3**	J	4.1		**15.2**	J	5.8	J	7.4	J	4.7	J
Potassium	µg/L	NE	116,000	28200	2,820	J	6,650	J	28,200		21,900		20,700		19,300	
Selenium	µg/L	18	NE	5.2	-	-	-	-	4.9	J	3.7	J	4.7	J	5.2	J
Sodium	µg/L	NE	1,390,000	81,300	18,900		42,900		68,400		81,300		52,400		59,300	
Thallium	µg/L	NE	NE	34.6	34.6		-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	2.9	-	-	-	-	1.2	J	-	-	2.9	J	-	-
Zinc	µg/L	1,100	507	23.2	23.2		8.6	B	13.4	J	-	-	14.3	J	7.7	B
METALS-FILTERED																
Aluminum	µg/L	3,700	309	3,320	-	-	-	-	15.5	J	12.8	J	19.1	J	**3,320**	
Arsenic	µg/L	0.045	7.4	6.2	-	-	6.2	J	-	-	-	-	-	-	5.7	J
Barium	µg/L	730	11,800	255	28.4	J	34.9	J	61.7	J	51.6	J	255		177	J
Calcium	µg/L	NE	316,000	283,000	283,000		181,000		201,000		165,000		90,500		95,500	
Chromium	µg/L	0.043	NE	5.5	-	-	-	-	-	-	-	-	-	-	5.5	J
Cobalt	µg/L	1.1	12.1	22.5	**22.5**	J	5.1	J	3.2	J	3.6	J	-	-	5.1	J
Copper	µg/L	150	19.8	10.5	-	-	-	-	-	-	-	-	-	-	10.5	J
Iron	µg/L	2,600	1,550	6,070	**4,590**		**4,990**		-	-	-	-	-	-	**6,070**	
Lead	µg/L	15	NE	5.8	5.8		-	-	2	J	2.2	J	-	-	4.9	J
Magnesium	µg/L	NE	217,000	90,800	77,600		61,000		90,800		75,000		38,400		39,200	
Manganese	µg/L	88	636	32,100	**32,100**		**6,270**		355		410		102		550	
Nickel	µg/L	73	8.6	14.8	**12.8**	J	3.9	J	**14.8**	J	6.1	J	6.6	J	**13.4**	J
Potassium	µg/L	NE	116,000	28,500	2,760	J	7,000	J	28,500		22,000		20,400		20,500	
Selenium	µg/L	18	NE	6.9	-	-	-	-	6.9	J	-	-	5.3	J	-	-
Sodium	µg/L	NE	1,390,000	81,700	21,000		44,300		69,900		81,700		53,900		60,500	
Thallium	µg/L	NE	NE	37.8	37.8		-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	5.9	-	-	-	-	1.1	J	-	-	0.9	J	5.9	J
Zinc	µg/L	1,100	507	23.4	23.2		9.2	J	12.1	J	11.4	J	11.4	J	23.4	
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	448,000	448,000		395,000		253,000		313,000		349,000		391,000	
Chloride	µg/L	NE	NE	40,000	11,500		40,000		25,600		35,400		38,700		37,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	1,020,000		745,000		897,000		730,000		394,000		395,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	130	J	-	-	41	J	-	-	55	J
Sulfate	µg/L	NE	NE	589,000	585,000		311,000	J	589,000		358,000	J	127,000		109,000	
Total dissolved solids	µg/L	NE	NE	1,890,000	1,520,000		1,080,000		1,890,000		1,230,000		660,000		619,000	
Total suspended solids	µg/L	NE	NE	300,000	-	-	25,000		23,000		6,000	J	78,000		300,000	
Turbidity	NTU	NE	NE	47	8.6		47		5.4	J	3.4		18.7		27.8	

Table 5-8

Detected Constituents in Overburden/Shale Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 5-9

Detected Constituents in Bedrock Monitoring Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-BEDGW-001				AP1-BEDGW-002				IT-MNTA-BEDGW-001			
				SAMPLE NO	AP3053		AP3073		AP3054		AP3074		LB3074		BEDGW-001-1109	
				DATE	9-May-09		6-Nov-09		10-May-09		10-Nov-09		19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	No		No		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
VOLATILES																
Acetone	µg/L	2,200	NE	463	140	J	463	J	-	-	92.9	B	345	J	-	-
Benzene	µg/L	0.41	2.4	1300	**613**		**1,300**		**67.1**		**27.5**		-	-	**3.7**	
Butanone, 2-	µg/L	710	NE	299	71.5		299		10.9		-	-	81.3	J	-	-
Carbon disulfide	µg/L	100	NE	12.3	12.3	J	-	-	3	J	1.9	J	11.6	J	3.8	
Chloroform	µg/L	0.19	NE	66.7	18		-	-	-	-	12		66.7		-	-
Chloromethane	µg/L	19	NE	216	-	-	-	-	-	-	216		-	-	-	-
Ethylbenzene	µg/L	1.5	0.87	176	**126**		**176**		**45.6**		**30.9**		**16.7**	J	**9.9**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	-	-	-	-	-	-	-	-	3.3	J
Methylene chloride	µg/L	4.8	NE	77.6	11.2	B	28.8	J	3	B	-	-	77.6	J	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	-	-	0.53	J	-	-	-	-	1.2	
Toluene	µg/L	230	1.7	730	**490**		**730**		**69.2**		**43.6**		**14.2**	J	**10**	
Xylenes, total	µg/L	20	5.5	1340	**1,060**		**1,340**		**473**		**370**		**235**		**136**	
SEMIVOLATILES																
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	9	J	8	J	-	-	0.97	J	-	-	-	-
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	24.7		20.7		2	J	2.8	J	-	-	-	-
Fluorene	µg/L	150	NE	5.4	-	-	-	-	-	-	-	-	5.4	J	-	-
Methylnaphthalene, 2-	µg/L	15	NE	256	36.2		32.7		14.5		14.5		71		256	J
Methylphenol, 2-	µg/L	180	NE	6.9	6.9	J	6.2	J	-	-	-	-	-	-	-	-
Naphthalene	µg/L	0.14	NE	64.9	33		33.2		11.8		15.3		17.7	J	64.9	J
Phenanthrene	µg/L	NE	NE	37.3	-	-	-	-	-	-	-	-	12.7	J	37.3	J
Phenol	µg/L	1,100	NE	6.6	6.6	J	6.6	J	-	-	-	-	-	-	-	-
METALS-UNFILTERED																
Aluminum	µg/L	3,700	309	90.4	57.2	J	45.3	J	67.5	J	46.7	J	90.4	B	79.6	J
Antimony	µg/L	1.5	NE	5.8	-	-	-	-	5.8	J	-	-	-	-	-	-
Arsenic	µg/L	0.045	7.4	110	**69.7**		**110**		**101**		**50.7**		-	-	-	-
Barium	µg/L	730	11,800	989	897		989		555		434		343		305	
Cadmium	µg/L	1.8	NE	1.4	-	-	-	-	-	-	-	-	1.4	J	-	-
Calcium	µg/L	NE	316,000	590000	**573,000**		**590,000**		246,000		220,000		314,000	J	280,000	
Copper	µg/L	150	19.8	0	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	2,600	1,550	4910	**4,910**		**1,570**		322		335	J	591		180	J
Lead	µg/L	15	NE	2.6	-	-	-	-	-	-	-	-	2.6	J	-	-
Magnesium	µg/L	NE	217,000	479000	**418,000**		**479,000**		155,000		155,000		**234,000**		212,000	
Manganese	µg/L	88	636	857	**857**		**704**		548		38		95.5		85.8	
Nickel	µg/L	73	8.6	5.8	5.8	J	2.8	J	-	-	-	-	-	-	-	-
Potassium	µg/L	NE	116,000	129000	110,000		**129,000**		59,600		88,800	J	111,000		**120,000**	
Selenium	µg/L	18	NE	11.9	11.9	J	-	-	6.3	J	5.2	J	-	-	-	-
Sodium	µg/L	NE	1,390,000	1470000	1,300,000		**1,470,000**		573,000		889,000		1,230,000		1,130,000	
Thallium	µg/L	NE	NE	5.3	5.3	J	-	-	-	-	-	-	3.8	J	-	-
Vanadium	µg/L	18	NE	2.8	2.2	J	-	-	2.6	J	1.3	J	2.8	J	1.6	J
Zinc	µg/L	1,100	507	16	11.5	J	8	B	16	J	7.7	J	11.6	J	11.5	B

Table 5-9

Detected Constituents in Bedrock Monitoring Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION CODE	AP1-BEDGW-001				AP1-BEDGW-002				IT-MNTA-BEDGW-001			
				SAMPLE NO	AP3053		AP3073		AP3054		AP3074		LB3074		BEDGW-001-1109	
				DATE	9-May-09		6-Nov-09		10-May-09		10-Nov-09		19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG		REG		REG		REG		REG	
				LOW-FLOW SAMPLED	No		No		No		No		No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS-FILTERED																
Aluminum	µg/L	3,700	309	409	23.2	J	26.1	J	**409**		24.8	J	43.3	J	52.6	J
Antimony	µg/L	1.5	NE	5.4	-	-	-	-	5.4	J	-	-	-	-	-	-
Arsenic	µg/L	0.045	7.4	133	**65.6**		**133**		**77.7**		**36.7**		-	-	-	-
Barium	µg/L	730	11,800	961	813		961		307		406		329		304	
Cadmium	µg/L	1.8	NE	0	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	µg/L	NE	316,000	596000	**521,000**		**596,000**		153,000		200,000		312,000		275,000	
Copper	µg/L	150	19.8	43.1	-	-	-	-	**43.1**		-	-	-	-	-	-
Iron	µg/L	2,600	1,550	124	-	-	77.4	J	124	J	-	-	-	-	-	-
Lead	µg/L	15	NE	7.5	-	-	-	-	7.5	J	-	-	2	J	2.3	J
Magnesium	µg/L	NE	217,000	471000	**427,000**		**471,000**		96,800		148,000		**231,000**		211,000	
Manganese	µg/L	88	636	804	**804**		**658**		379		10.5	J	47		70.2	
Nickel	µg/L	73	8.6	55.2	3.8	J	-	-	**55.2**		-	-	-	-	-	-
Potassium	µg/L	NE	116,000	131000	107,000		**131,000**		45,300		84,800	J	113,000		**120,000**	
Selenium	µg/L	18	NE	16.7	16.7	J	-	-	15	J	4	J	-	-	4.2	J
Sodium	µg/L	NE	1,390,000	1410000	1,300,000		**1,410,000**		644,000		833,000		1,210,000		1,160,000	
Thallium	µg/L	NE	NE	0	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	18	NE	3.1	2	J	-	-	3.1	J	-	-	2.7	J	0.93	J
Zinc	µg/L	1,100	507	140	8.3	J	-	-	140		-	-	11.2	J	-	-
WATER QUALITY PARAMETERS																
Alkalinity	µg/L	NE	NE	773000	386,000		453,000		678,000		728,000		773,000		718,000	
Chloride	µg/L	NE	NE	4280000	2,840,000		4,280,000		705,000		2,020,000	J	132,000		2,550,000	
Cyanide, total	µg/L	73	NE	120	37	J	-	-	120	J	-	-	71		-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	3,150,000		3,450,000		1,250,000				1,740,000		1,570,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	46	J	-	-	190	J	-	-	90	J
Sulfate	µg/L	NE	NE	93400	13,600		-	-	93,400		-	-	9,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	9,580,000		7,680,000		3,130,000		3,520,000		5,780,000		4,680,000	
Total suspended solids	µg/L	NE	NE	250000	250,000		26,000		88,000		130,000		53,000		193,000	
Turbidity	NTU	NE	NE	296	35.1	J	296		6.3	J	180	J	66	J	71.5	

Table 5-9

Detected Constituents in Bedrock Monitoring Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former Plum Brook Ordnance Works, Sandusky, Ohio

Footnotes:
NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Parts per billion.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Table 6-1

Detected Constituents in Powerhouse 2 Ash Pits Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

				Location Code:	AP2-SB01						AP2-SB02									
				Sample Number:	AP0100		AP0101		AP0102		AP0103		AP0104		AP0105		AP0106		AP0107	
				Sample Date:	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																				
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	0.525	J	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	0.0827	J	-	-	-	-	0.0464	J	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	0.0844	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	0.13	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	1.43		-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	0.0979	J	-	-	-	-	0.0639	J	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	0.132	J	-	-	-	-	0.131	J	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	0.0446	J	-	-	-	-	0.0559	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	0.0733	J	-	-	0.0855	J	0.0964	J	-	-	-	-	-	-	0.0544	J
Pyrene	mg/kg	170	NE	0.111	0.111	J	-	-	-	-	0.0894	J	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7700	15500	15100	6,460	J	6,420	J	8,750	J	9,310	J	12,700	J	8,930	J	6,930		10,700	J
Antimony	mg/kg	3.1	9.3	0.958	0.81		0.269	J	0.355	J	0.958		0.362	J	0.287	J	-	-	0.626	
Arsenic	mg/kg	0.39	36.5	26.8	11.6		4.93		11.3		15.3		15.7	J	8.31	J	4		12.1	
Barium	mg/kg	1500	826	109	55.7	J	45.6		26.8		84.4	J	85.3	J	59.4	J	54.4		41.2	J
Beryllium	mg/kg	16	1	16.9	**4.74**		**5.97**		**6.72**		**15.3**	J	**9.06**	J	**6.76**	J	-	-	**7.06**	J
Cadmium	mg/kg	7	NE	0.716	0.436	J	-	-	-	-	0.381	J	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	47,200	J	4,310		47,400		7,110		23,300		16,100		7,170	J	46,600	
Chromium	mg/kg	0.29	29	22.4	8.64		11.5		13		11.1		19.8		13.7		10.6		16	
Cobalt	mg/kg	2.3	116	15.6	7.74		8.32		11.9		14.6	J	13.4	J	10.9	J	8.3		11.7	J
Copper	mg/kg	310	56.2	38.4	23.6	J	18.3	J	32	J	33.7	J	28.9	J	20.9	J	13.4		27.8	J
Iron	mg/kg	5500	234000	109000	14,300	J	16,500	J	23,100	J	61,300	J	30,500	J	19,400	J	13,300		23,200	J
Lead	mg/kg	40	48.6	50.7	50.7		8.39		13		22.5		13.8		11.9		7.5		18.9	
Magnesium	mg/kg	NE	10400	12200	8,960	J	2,350	J	**11,400**	J	1,560	J	8,640	J	4,940	J	3,340		**10,800**	J
Manganese	mg/kg	180	3506	726	354	J	172		386		546		726	J	351	J	320		431	
Mercury	mg/kg	2.3	0.09	0.118	**0.0959**		0.0245		0.0128	J	0.0539		0.0162	J	0.0164	J	-	-	-	-
Nickel	mg/kg	150	55.1	39.7	18.3	J	20.2		32.6		35.5		35.6		26.9		18.7		30.8	
PotaSurfaceium	mg/kg	NE	3390	2870	893	J	589		1,160		587		1,170		803		1,070	J	1,450	
Selenium	mg/kg	39	2	1.44	0.727	J	-	-	-	-	1.36		-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	55.1	B	68.7	B	107		60.4	B	93.9		64.9	B	-	-	152	
Thallium	mg/kg	NE	1.3	0.939	0.425	J	-	-	0.423	J	0.416	J	0.3	J	-	-	-	-	0.343	J
Vanadium	mg/kg	39	40.9	26.9	15.9		16.5		17.3		21.4		26.2		18.1		13		20.2	
Zinc	mg/kg	2300	322	102	64		67.4		59.1		88.6		74.6		66.2		43.5		62.9	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	11,400		-	-	-	-	-	-	-	-

Table 6-1

Detected Constituents in Powerhouse 2 Ash Pits Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

				Location Code:	AP2-SB03						AP2-SB04						AP2-SB05					
				Sample Number:	AP0108		AP0109		AP0110		AP0111		AP0112		AP0113		AP0114		AP0115		AP0116	
				Sample Date:	18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		18-Jan-09		19-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface		Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																						
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	0.0162	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																						
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	0.0307		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	0.0599	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-	-	-	0.0444	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	0.0667	J	-	-	-	-	0.0453	J	-	-	-	-	0.0491	J
Pyrene	mg/kg	170	NE	0.111	0.044	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																						
Aluminum	mg/kg	7700	15500	15100	8,070		15,000		7,720		7,130		7,830		8,670		8,800	J	8,060	J	9,300	J
Antimony	mg/kg	3.1	9.3	0.958	0.637		0.257	J	0.329	J	0.485		0.312	J	0.392	J	0.922		0.259	J	0.486	
Arsenic	mg/kg	0.39	36.5	26.8	7.71	J	5.27	J	12.6	J	26.8	J	4.51	J	12.1	J	24.4		6.27		11.1	
Barium	mg/kg	1500	826	109	69.4	J	98.9	J	18.6	J	98.4	J	61.5	J	35.6	J	109	J	68.2	J	49	J
Beryllium	mg/kg	16	1	16.9	**6.46**	J	**7.43**	J	**6.35**	J	**16.3**	J	**6.68**	J	**7.02**	J	**15.5**	J	**7.61**	J	**7.53**	J
Cadmium	mg/kg	7	NE	0.716	0.558		-	-	-	-	-	-	-	-	-	-	0.716		-	-	0.276	J
Calcium	mg/kg	NE	52300	153000	3,430	J	36,500	J	**54,300**	J	2,160	J	3,010	J	50,700	J	4,140		351		42,300	
Chromium	mg/kg	0.29	29	22.4	12	J	22.1	J	11.8	J	10.5	J	11.9	J	12.7	J	12.8		11.7		14.4	
Cobalt	mg/kg	2.3	116	15.6	8.68	J	10.8	J	10.7	J	5.96	J	7.88	J	11	J	8.29	J	6.67	J	14	J
Copper	mg/kg	310	56.2	38.4	22.5		29.8		29.6		26		20.9		38.4		31.3	J	15.6	J	33.6	J
Iron	mg/kg	5500	234000	109000	19,100		24,900		22,100		109,000		19,200		24,400		61,600	J	22,100	J	24,500	J
Lead	mg/kg	40	48.6	50.7	27.7	J	16.7	J	15.8	J	10.1	J	18.9	J	16	J	27.4		12.2		13.4	
Magnesium	mg/kg	NE	10400	12200	2,150	J	10,100	J	**10,400**	J	442	J	2,530	J	**10,800**	J	1,320	J	1,980	J	8,760	J
Manganese	mg/kg	180	3506	726	211		436		414		116		87.4		522		319		100		551	
Mercury	mg/kg	2.3	0.09	0.118	0.0642		0.013	J	0.0132	J	0.0265		0.0352		0.0147	J	**0.118**		0.0242	J	-	-
Nickel	mg/kg	150	55.1	39.7	21.7	J	31.5	J	27.4	J	17.1	J	24.8	J	28.8	J	20.5		18		36.8	
PotaSurfaceium	mg/kg	NE	3390	2870	745		1,570		1,110		827		705		1,150		837		513		990	
Selenium	mg/kg	39	2	1.44	0.928	J	-	-	-	-	0.678	J	0.859	J	-	-	1.44		-	-	0.779	J
Sodium	mg/kg	NE	NE	152	36.3	B	119		120		55.7	B	43.6	B	119		79.2		18.4	B	91.4	
Thallium	mg/kg	NE	1.3	0.939	0.47	J	0.35	J	0.336	J	0.468	J	-	-	0.315	J	0.939		-	-	0.347	J
Vanadium	mg/kg	39	40.9	26.9	18.7		25.3		15.4		26.9		17.8		17.5		23		17		18.2	
Zinc	mg/kg	2300	322	102	80	J	68.5	J	61.5	J	57	J	64.4	J	60.4	J	102		68.9		85.3	
GENERAL CHEMISTRY																						
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6-1

Detected Constituents in Powerhouse 2 Ash Pits Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

				Location Code:	AP2-SB06						AP2-SB07									
				Sample Number:	AP0117		AP0118		AP0119		AP0120		AP0121		AP0122		AP0123		AP0124	
				Sample Date:	15-Jan-09		15-Jan-09		15-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Surface		Surface		Surface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft		0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		REG		FD		FS		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs																				
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES																				
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	0.622		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	0.0403	J	-	-	-	-	-	-	-	-	0.0798	J
Pyrene	mg/kg	170	NE	0.111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
METALS																				
Aluminum	mg/kg	7700	15500	15100	7,150	J	6,750	J	13,200	J	7,100	J	8,180	J	7,200		5,250	J	7,150	J
Antimony	mg/kg	3.1	9.3	0.958	0.708		0.412	J	0.44	J	0.336	J	0.291	J	-	-	0.269	J	0.479	
Arsenic	mg/kg	0.39	36.5	26.8	11.4		6.33		3.55		6.09		6.04		5.5		6.18		10.9	
Barium	mg/kg	1500	826	109	98.7		58.3		53.4	J	44.5		56.7		48.6		43.7		20.8	J
Beryllium	mg/kg	16	1	16.9	**12.1**		**6.9**		**7.73**	J	**6.01**		**6.41**		-	-	**5.46**		**6.31**	J
Cadmium	mg/kg	7	NE	0.716	0.423	J	0.293	J	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	2,830		2,090		44,000		2,100		2,270		1,820	J	1,840		**153,000**	
Chromium	mg/kg	0.29	29	22.4	7.84		10.1		19.4		10.6		11.8		10.4		8.82		11	
Cobalt	mg/kg	2.3	116	15.6	4.64		8.93		14.6	J	8.14		8.99		7.7		7.46		11	J
Copper	mg/kg	310	56.2	38.4	22.2	J	12.6	J	32.1	J	18	J	16.5	J	14.6		13.8	J	31.5	J
Iron	mg/kg	5500	234000	109000	51,800	J	19,900	J	24,000	J	17,600	J	19,100	J	16,600		15,500	J	55,100	J
Lead	mg/kg	40	48.6	50.7	12.5		11.2		14.3		12.5		12.8		9.3		9.74		15.9	
Magnesium	mg/kg	NE	10400	12200	819	J	2,110	J	**12,000**	J	2,100	J	2,350	J	1,880		1,730	J	9,490	J
Manganese	mg/kg	180	3506	726	243		234		392		198		226		169		152		372	
Mercury	mg/kg	2.3	0.09	0.118	0.0688		0.0156	J	0.0132	J	0.0203	J	0.0193	J	-	-	0.0112	J	-	-
Nickel	mg/kg	150	55.1	39.7	13.7		21.8		36.7		19.1		20.2		17.9		18.5		32.5	
PotaSurfaceium	mg/kg	NE	3390	2870	616		426		1,730		450		470		703	J	323		1,060	
Selenium	mg/kg	39	2	1.44	0.737	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	76.3	B	37.1	B	135		28.4	B	28	B	-	-	43.3	B	116	
Thallium	mg/kg	NE	1.3	0.939	0.312	J	-	-	0.293	J	-	-	-	-	-	-	-	-	0.316	J
Vanadium	mg/kg	39	40.9	26.9	17.3		15.5		23.2		15.4		17.4		14.1		13.6		13.6	
Zinc	mg/kg	2300	322	102	53.2		63.7		73		63.2		27.8		51.4		55.4		52.7	
GENERAL CHEMISTRY																				
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6-1

Detected Constituents in Powerhouse 2 Ash Pits Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

				Location Code:	AP2-SB08									
				Sample Number:	AP0125		AP0126		AP0127		AP0128		AP0129	
				Sample Date:	16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09		16-Jan-09	
				Sample Type:	Surface		Subsurface		Subsurface		Subsurface		Subsurface	
				Sample Depth:	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft	
				Sample Purpose:	REG		REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
PCBs														
Aroclor 1016	mg/kg	0.39	NE	0.525	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.22	NE	0.0162	-	-	-	-	-	-	-	-	-	-
SEMIVOLATILES														
Benzo(a)anthracene	mg/kg	0.15	NE	0.0827	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.0844	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	0.13	-	-	-	-	-	-	-	-	-	-
Benzoic acid	mg/kg	24000	NE	1.43	-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	15	NE	0.0979	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.132	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.0559	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0964	-	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	170	NE	0.111	-	-	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7700	15500	15100	4,070	J	5,350	J	15,100	J	14,900	J	12,100	
Antimony	mg/kg	3.1	9.3	0.958	-	-	0.227	J	-	-	0.248	J	-	-
Arsenic	mg/kg	0.39	36.5	26.8	12.8		12.6		6.16		6.61		7	
Barium	mg/kg	1500	826	109	73.2	J	56	J	81	J	83.7	J	85	
Beryllium	mg/kg	16	1	16.9	16.9	J	**8.48**	J	**8.51**	J	**8.11**	J	-	-
Cadmium	mg/kg	7	NE	0.716	-	-	-	-	-	-	-	-	-	-
Calcium	mg/kg	NE	52300	153000	1,650		1,860		44,800		45,500		45,000	J
Chromium	mg/kg	0.29	29	22.4	6.13		8.82		22.4		21.9		18.5	
Cobalt	mg/kg	2.3	116	15.6	3.9	J	8.7	J	15.6	J	14.6	J	12.4	
Copper	mg/kg	310	56.2	38.4	21.3	J	11	J	31.1	J	30.1	J	23.9	
Iron	mg/kg	5500	234000	109000	72,600	J	28,000	J	26,600	J	28,500	J	23,900	
Lead	mg/kg	40	48.6	50.7	4.64		9.05		11.6		14.1		10.7	
Magnesium	mg/kg	NE	10400	12200	312	J	1,730	J	**12,200**	J	**11,500**	J	10,100	
Manganese	mg/kg	180	3506	726	98.2		196		473		432		363	
Mercury	mg/kg	2.3	0.09	0.118	0.034		0.0151	J	-	-	-	-	-	-
Nickel	mg/kg	150	55.1	39.7	10.5		22		39.7		38		32.8	
PotaSurfaceium	mg/kg	NE	3390	2870	477		371		1,980		1,990		2,870	J
Selenium	mg/kg	39	2	1.44	0.914	J	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	152	36.4	B	27.4	B	145		134		-	-
Thallium	mg/kg	NE	1.3	0.939	0.308	J	-	-	-	-	-	-	-	-
Vanadium	mg/kg	39	40.9	26.9	18.8		15.1		25.4		24.7		20.5	
Zinc	mg/kg	2300	322	102	41.4		58.9		76.6		73.4		61.3	
GENERAL CHEMISTRY														
Total organic carbon	mg/kg	NE	NE	11400	-	-	-	-	-	-	-	-	-	-

Table 6-1

Detected Constituents in Powerhouse 2 Ash Pits Surface and Subsurface Soil Samples Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

NE - Not established (RBSCs), not evaluated (BSCs).
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
mg/kg - Milligrams per kilogram.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Source: Shaw Environmental, Inc., 2010, *Powerhouse 2 Ash Pits Site Characterization Report, Draft, Plum Brook Ordnance Works, Sandusky, Ohio,* March.

Table 6-2

Detected Constituents in Powerhouse 2 Ash Pits Overburden/Shale Monitoring Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

				Location Code:	AP2-MW01		AP2-MW02						AP2-MW03	
				Sample Number:	AP3057		AP3058		AP3059		AP3060		AP3061	
				Sample Date:	23-May-09		25-May-09		25-May-09		26-May-09		24-May-09	
				Sample Depth:	0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
				Sample Purpose:	REG		REG		FD		FS		REG	
				Low-Flow Sampled:	Yes		Yes		Yes		Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
Metals-Unfiltered														
Aluminum	µg/L	3,700	309	0,133	133	J	79.1	J	77.6	J	-	-	47.1	J
Barium	µg/L	730	11,800	98	98	J	25.3	J	24.5	J	-	-	25.2	J
Cadmium	µg/L	1.8	NE	1.1	-	-	1.1	J	1	J	-	-	-	-
Calcium	µg/L	NE	316,000	112,000	112,000		102,000		102,000		94,900		54,400	
Cobalt	µg/L	1.1	12.1	8.3	-	-	7.9	J	8.3	J	-	-	-	-
Magnesium	µg/L	NE	217,000	38,700	38,700		11,600		11,600		10,800		12,700	
Manganese	µg/L	88	636	229	82.2		229		229		212		173	
Nickel	µg/L	73	8.6	74.2	-	-	**74.2**		**74.2**		**68.9**		-	-
Potassium	µg/L	NE	116,000	8,940	4,150	J	7,690	J	7,410	J	8,940		1,500	J
Selenium	µg/L	18	NE	5.7	-	-	-	-	-	-	-	-	5.7	B
Sodium	µg/L	NE	1,390,000	10,200	7,440	J	2,560	J	2,460	J	-	-	10,200	J
Vanadium	µg/L	18	NE	3.7	3.7	J	-	-	-	-	-	-	1.4	J
Zinc	µg/L	1,100	507	42.6	-	-	42.6		33.9		29.9		-	-
Metals-Filtered														
Aluminum	µg/L	3,700	309	45.4	-	-	45.4	J	44	J	-	-	-	-
Barium	µg/L	730	11,800	88.1	88.1	J	23.9	J	23.6	J	-	-	22.3	J
Calcium	µg/L	NE	316,000	103,000	102,000		96,400		93,100		103,000		47,200	
Cobalt	µg/L	1.1	12.1	8.9	-	-	8.9	J	8.7	J	-	-	-	-
Magnesium	µg/L	NE	217,000	34,100	34,100		11,000		10,600		11,900	J	11,500	
Manganese	µg/L	88	636	220	72.3		220		214		218		171	
Nickel	µg/L	73	8.6	74.5	-	-	**74.5**		**72.1**		**72.6**		-	-
Potassium	µg/L	NE	116,000	9,500	5,030	J	9,090	J	8,950	J	9,500		1,950	J
Sodium	µg/L	NE	1,390,000	11,000	8,520	J	3,030	J	2,930	J	-	-	11,000	
Zinc	µg/L	1,100	507	33.6	-	-	33.6		32.4		31		-	-
Water Quality Parameters														
Alkalinity	µg/L	NE	NE	362,000	362,000		70,300		73,400		72,000		116,000	
Chloride	µg/L	NE	NE	12,600	4,600		4,100		3,600		12,600		6,500	
Hardness	µg/L	NE	NE	330,000							330,000			
HARDNESS (as CaCO3)	µg/L	NE	NE	439,000	439,000		300,000		302,000				188,000	
Nitrate-Nitrite	µg/L	NE	NE	10,900	65	J	10,900		10,900		8,700		610	
Sulfate	µg/L	NE	NE	173,000	81,500		165,000		159,000		173,000		94,900	
Total dissolved solids	µg/L	NE	NE	508,000	294,000	J	507,000	J	508,000	J	460,000		295,000	J
Total suspended solids	µg/L	NE	NE	4,000	-	-	-	-	4,000	J	-	-	-	-
Turbidity	NTU	NE	NE	1.00	-	-	-	-	-	-	-	-	1	J

Table 6-2

Detected Constituents in Powerhouse 2 Ash Pits Overburden/Shale Monitoring Wells Above RBSCs and/or BSCs
Ash Pit 1 and Ash Pit 3 Site Characterization Report
Former PBOW, Sandusky, Ohio

NE - Not established (RBSCs), not evaluated (BSCs).
NA - Not analyzed.
Shaded cell indicates value is greater than RBSC.
Bold text indicates value is greater than the BSC.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1.
For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
MDC - Maximum detected concentration for the AOC ("B" qualified data not included).
BSC - Background screening concentration.
"-" - Not Detected.
µg/L - Micrograms per liter.
mg/L - Milligrams per liter.
NM - Not measured.

Validation Qualifiers (VQ)
J - The analyte was postively identifed; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

Source: Shaw Environmental, Inc., 2010, *Powerhouse 2 Ash Pits Site Characterization Report*, *Draft, Plum Brook Ordnance Works, Sandusky, Ohio,* March.

FIGURES

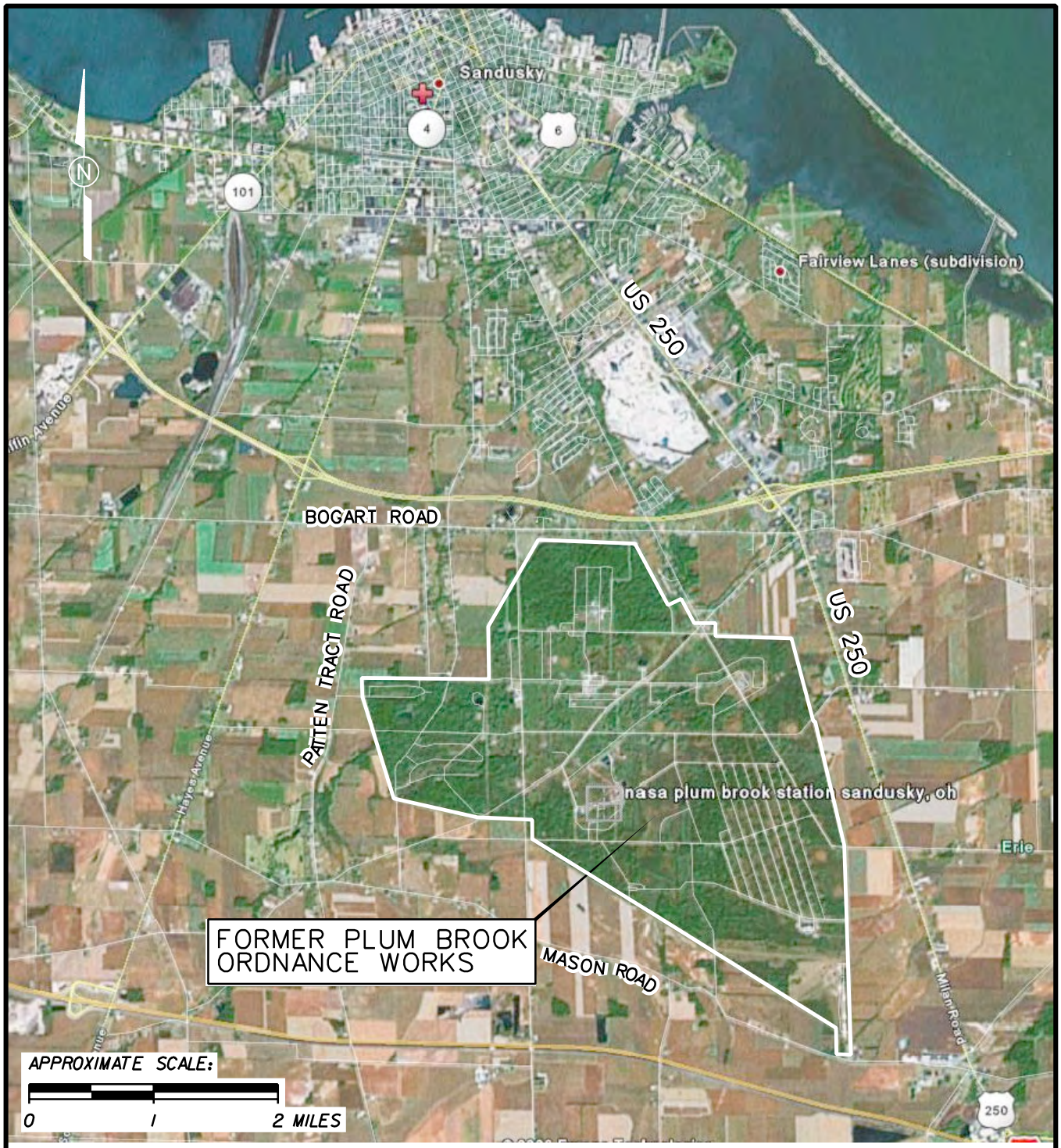

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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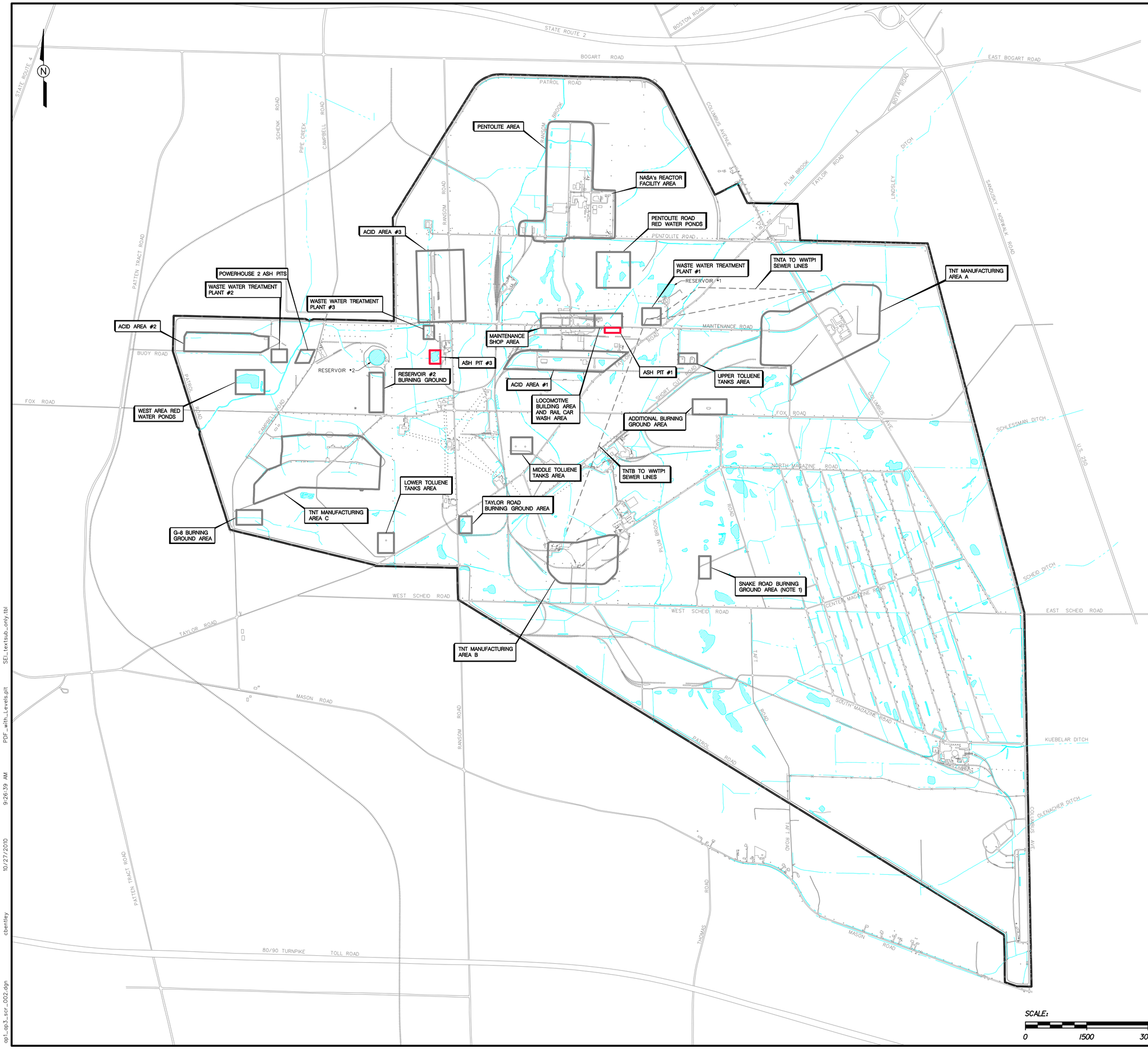

LEGEND:

- AREA OF CONCERN
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

SCALE:

0 1500 3000 FEET

Shaw® a world of Solutions™

FIGURE 1-2
LOCATION OF ASH PIT 1 AND ASH PIT 3 AT PBOW

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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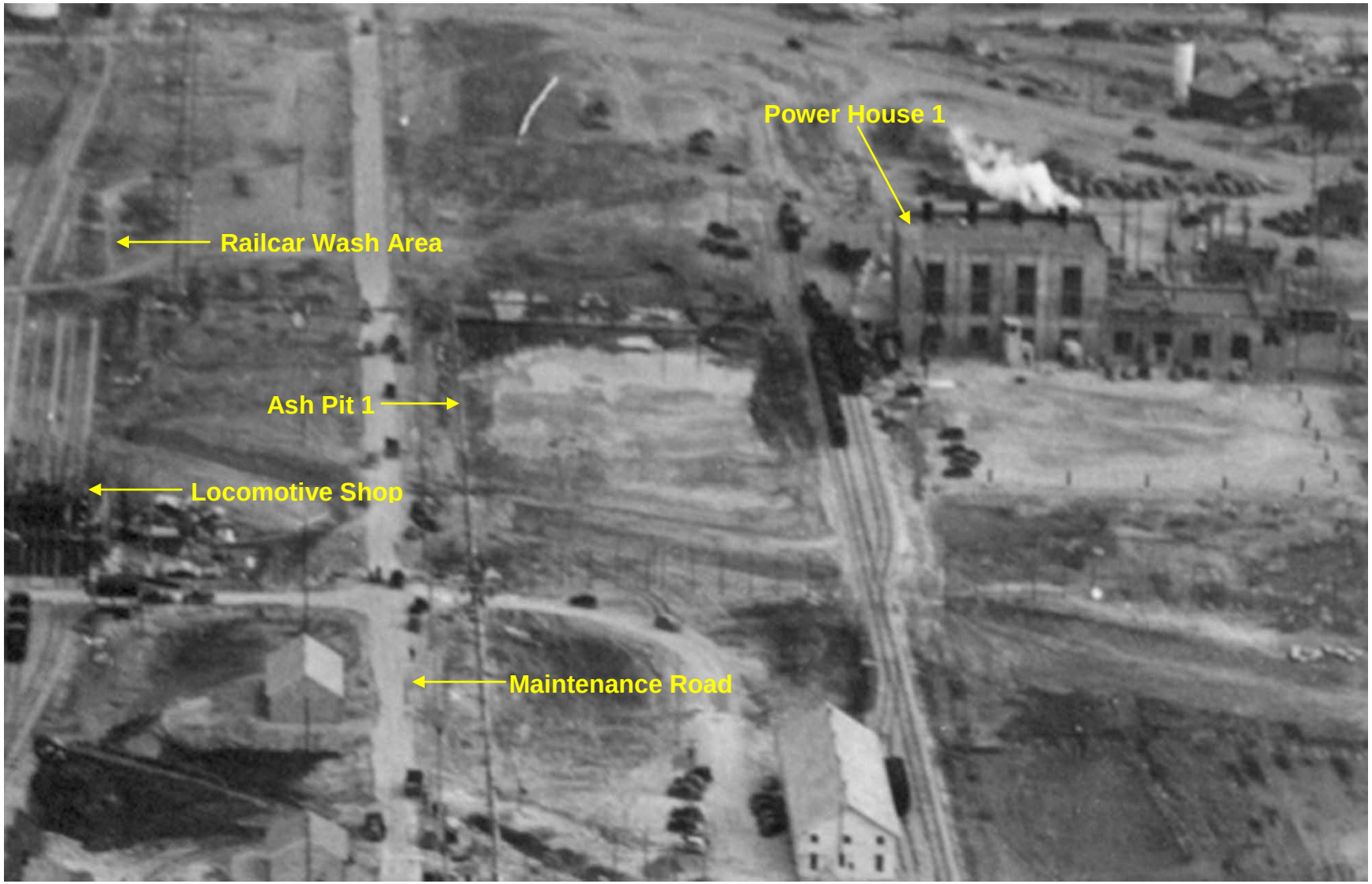


Figure 1-3

Ash Pit 1 Looking East
19 January 1942

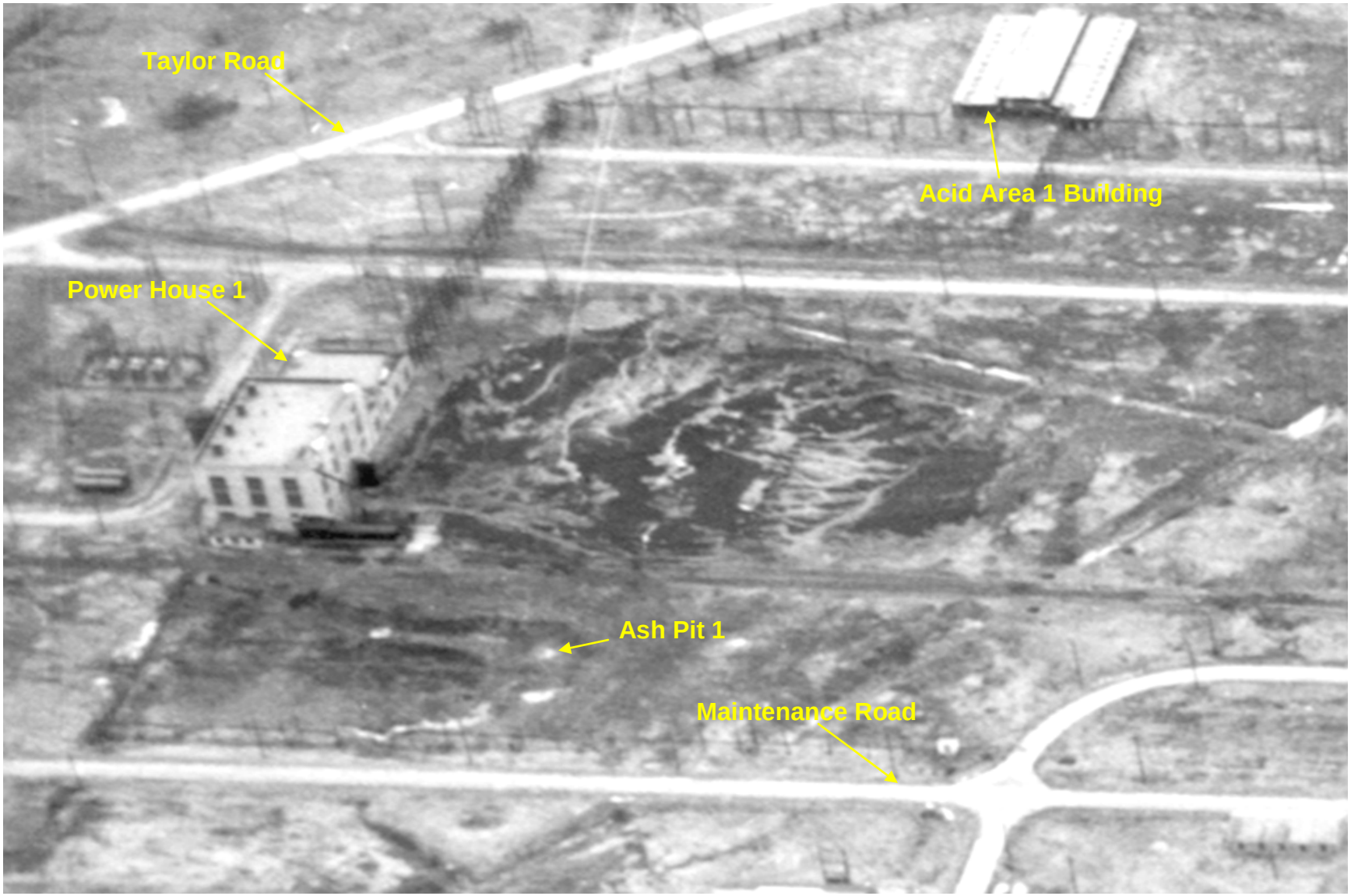
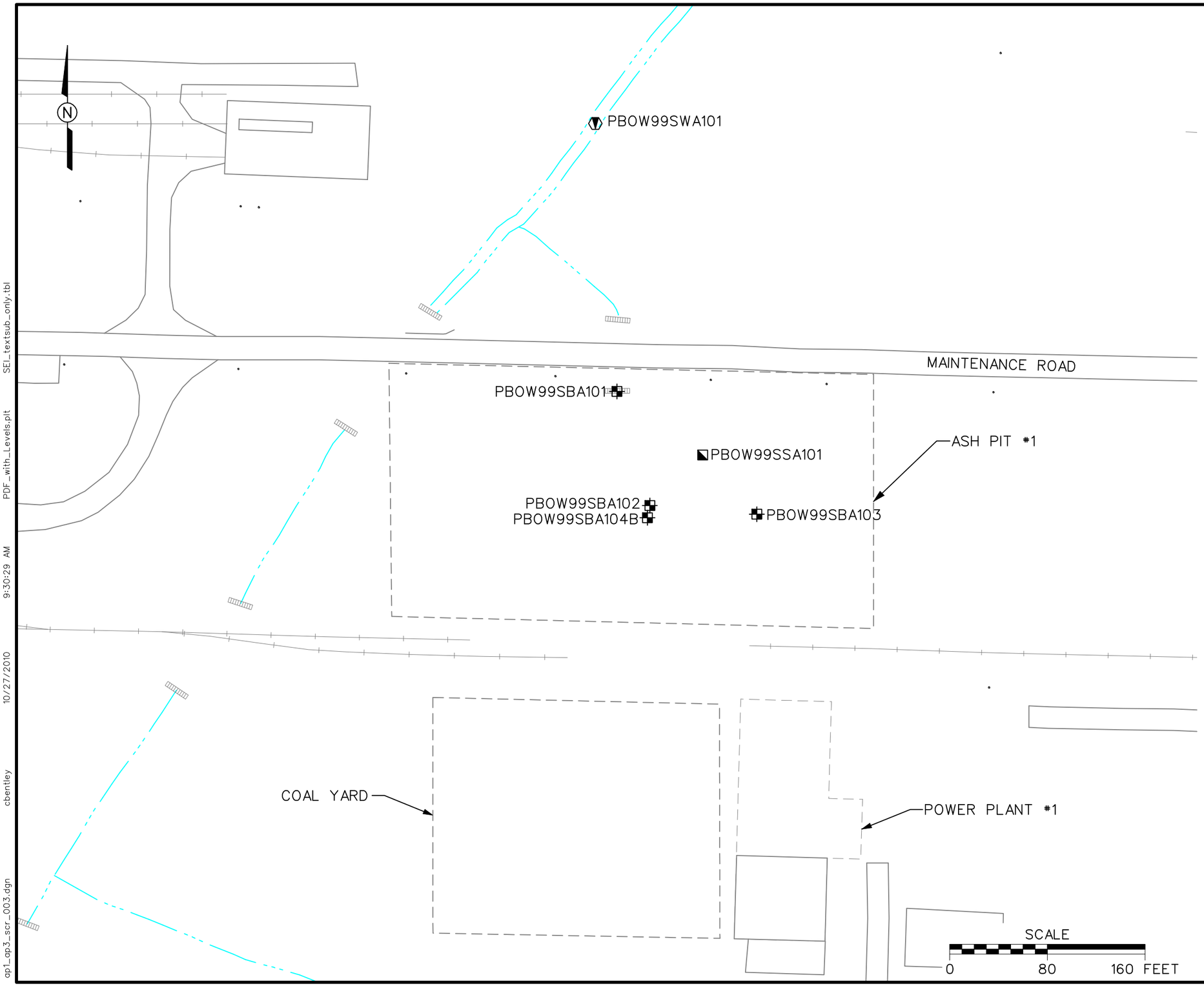


Figure 1-4

Ash Pit 1 Looking South
circa 1960



LEGEND:

- PREVIOUS SOIL BORING (USACE, 2000)
- PREVIOUS SURFACE SOIL SAMPLE (USACE, 2000)
- PREVIOUS SURFACE WATER/SEDIMENT SAMPLE (USACE, 2000)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

NOTES:

1. PREVIOUS SOIL SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).

FIGURE 1-5
1999 SI SAMPLE LOCATIONS - ASH PIT 1

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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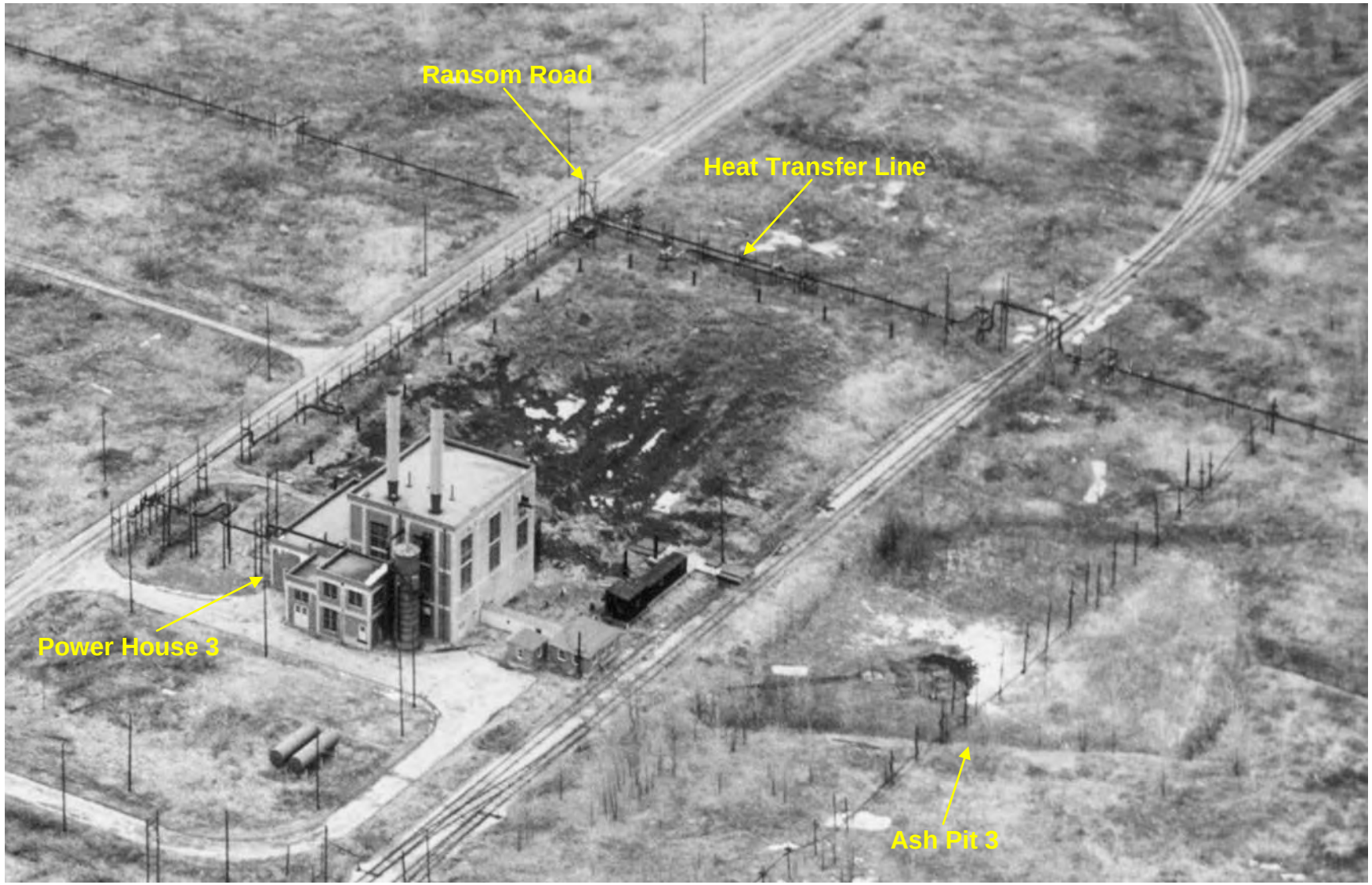


Figure 1-6

Ash Pit 3, Looking Southeast
circa 1960

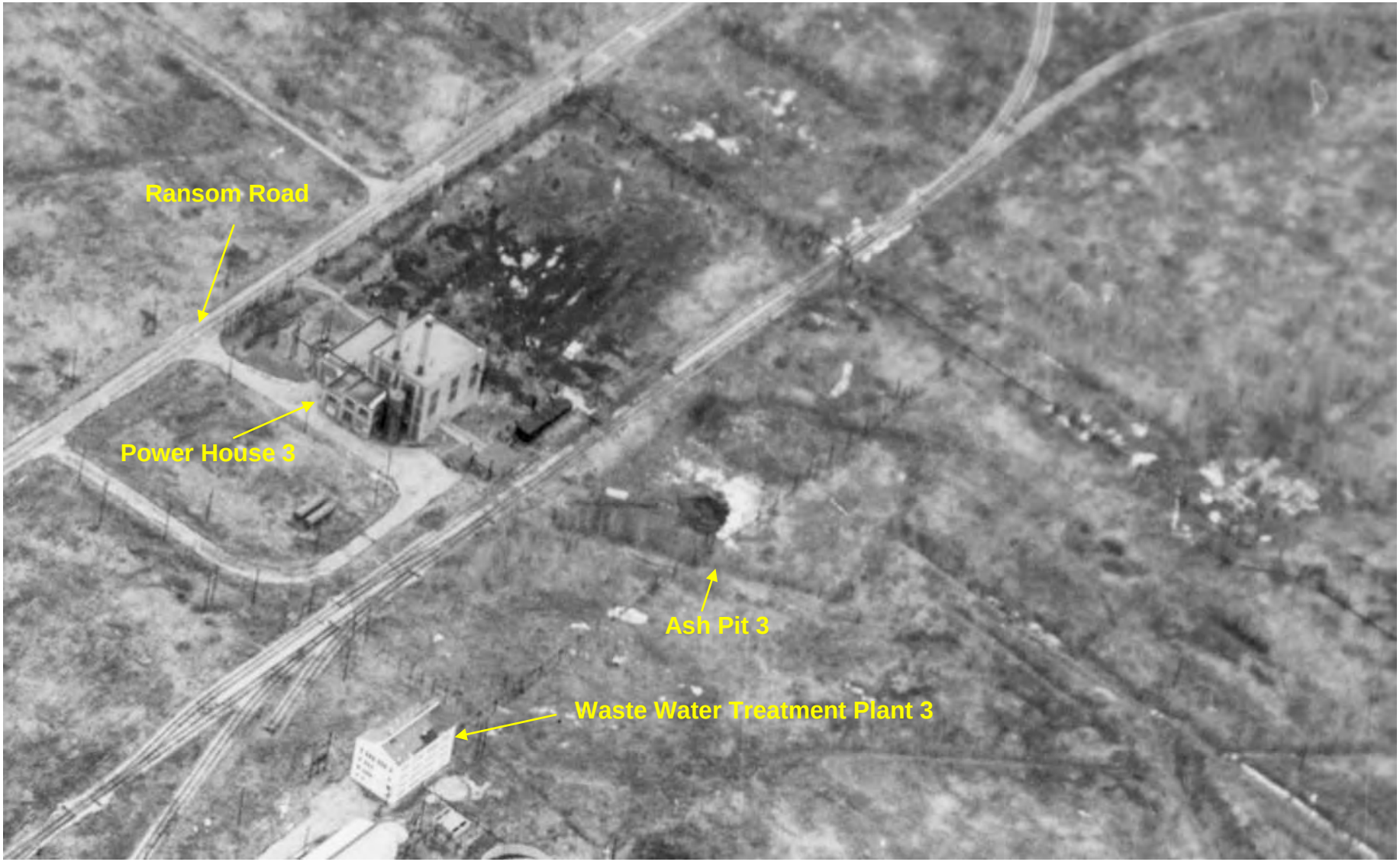
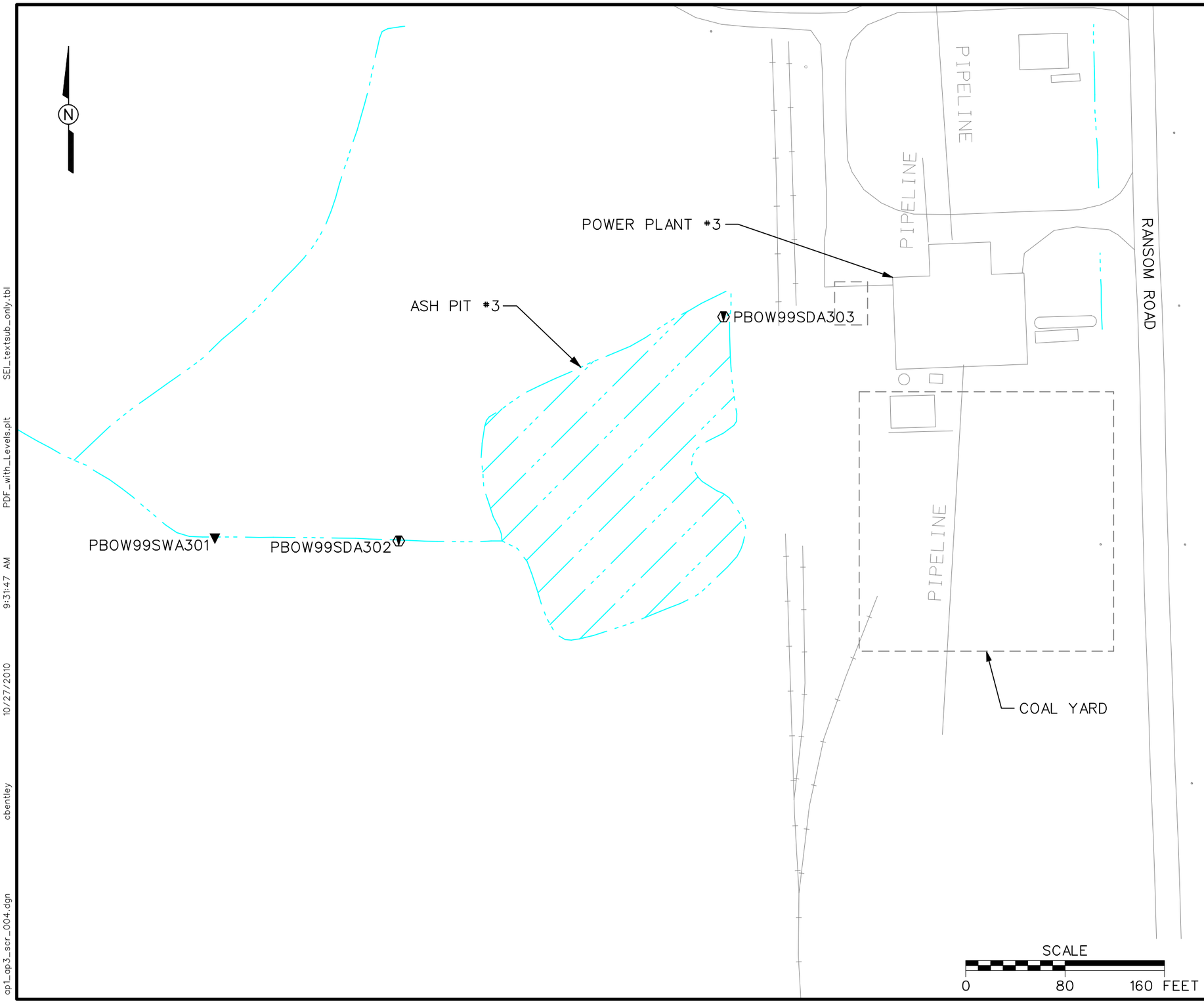


Figure 1-7

Ash Pit 3 Looking Southeast
circa 1960



LEGEND:

- PREVIOUS SEDIMENT/SURFACE WATER SAMPLE (USACE, 2000)
- PREVIOUS SURFACE WATER SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

NOTES:

1. PREVIOUS SEDIMENT SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).

FIGURE 1-8
1999 SI SAMPLE LOCATIONS - ASH PIT 3

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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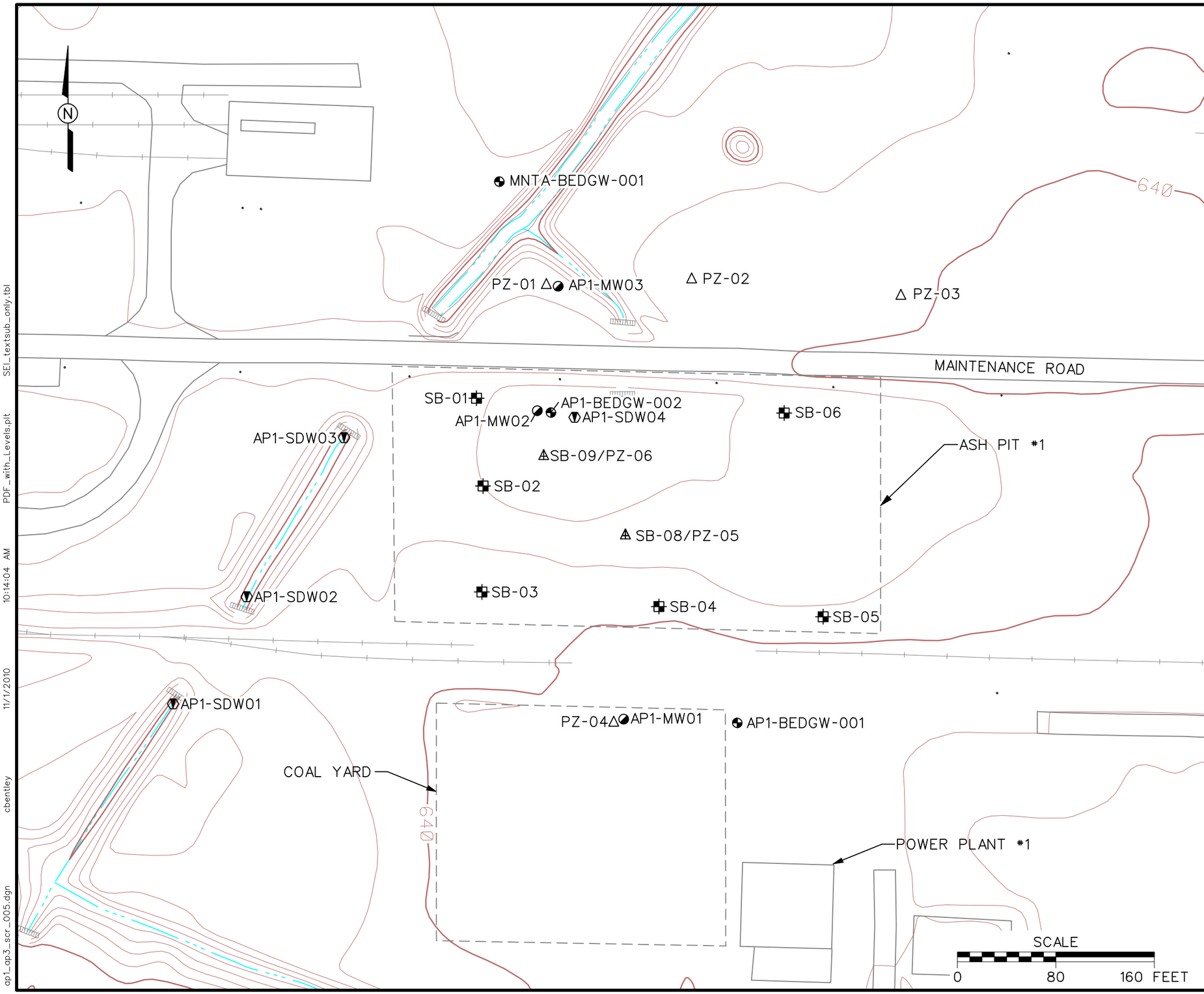

LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)

NOTES:

1. NO BORING LABELED SB-07 WAS DRILLED.

FIGURE 3-1
ASH PIT 1 WITH GENERAL SITE FEATURES AND SITE TOPOGRAPHY

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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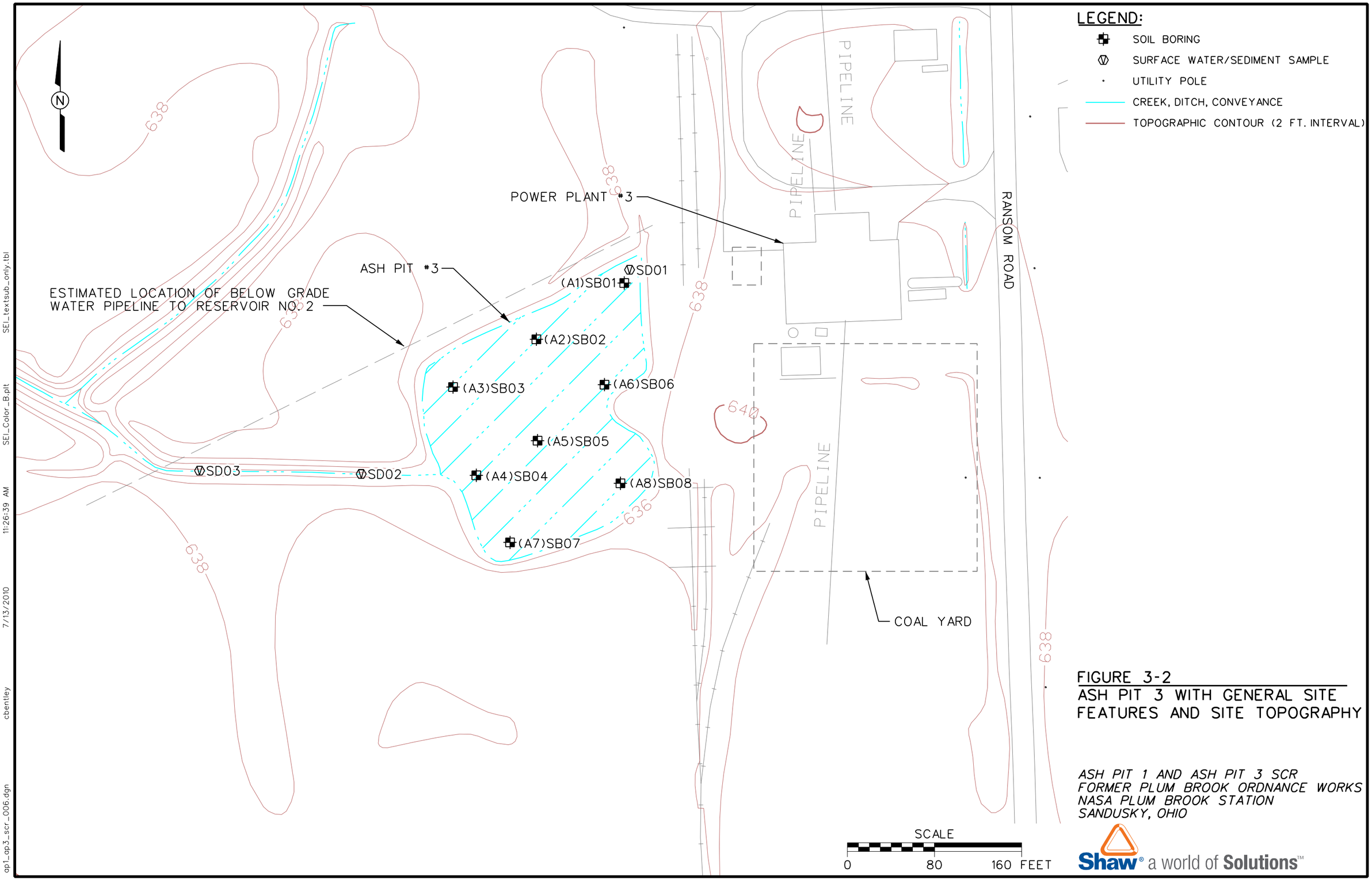

FIGURE 3-2
ASH PIT 3 WITH GENERAL SITE FEATURES AND SITE TOPOGRAPHY

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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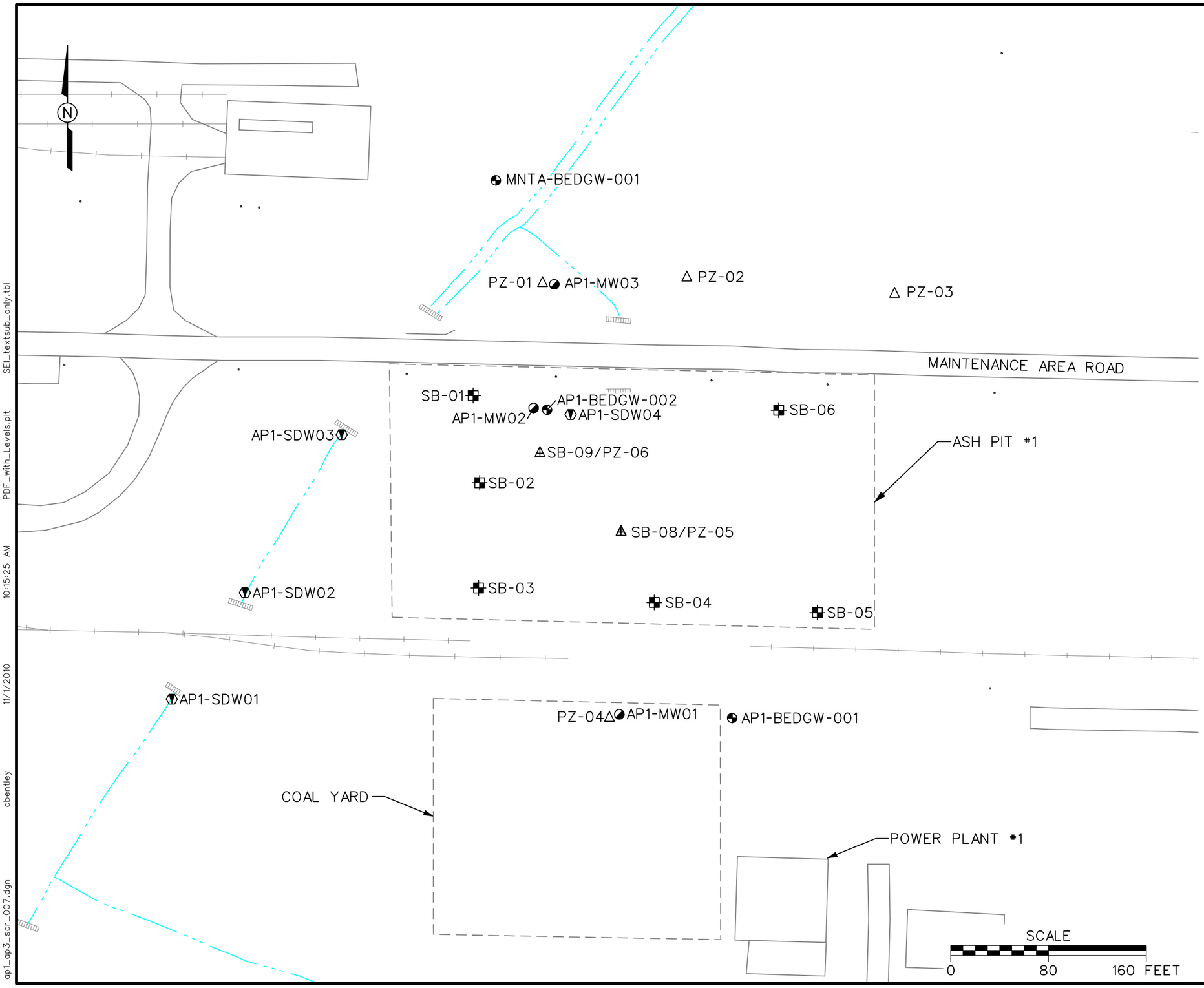

LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

NOTES:

1. NO BORING LABELED SB-07 WAS DRILLED.

FIGURE 5-1
ASH PIT 1 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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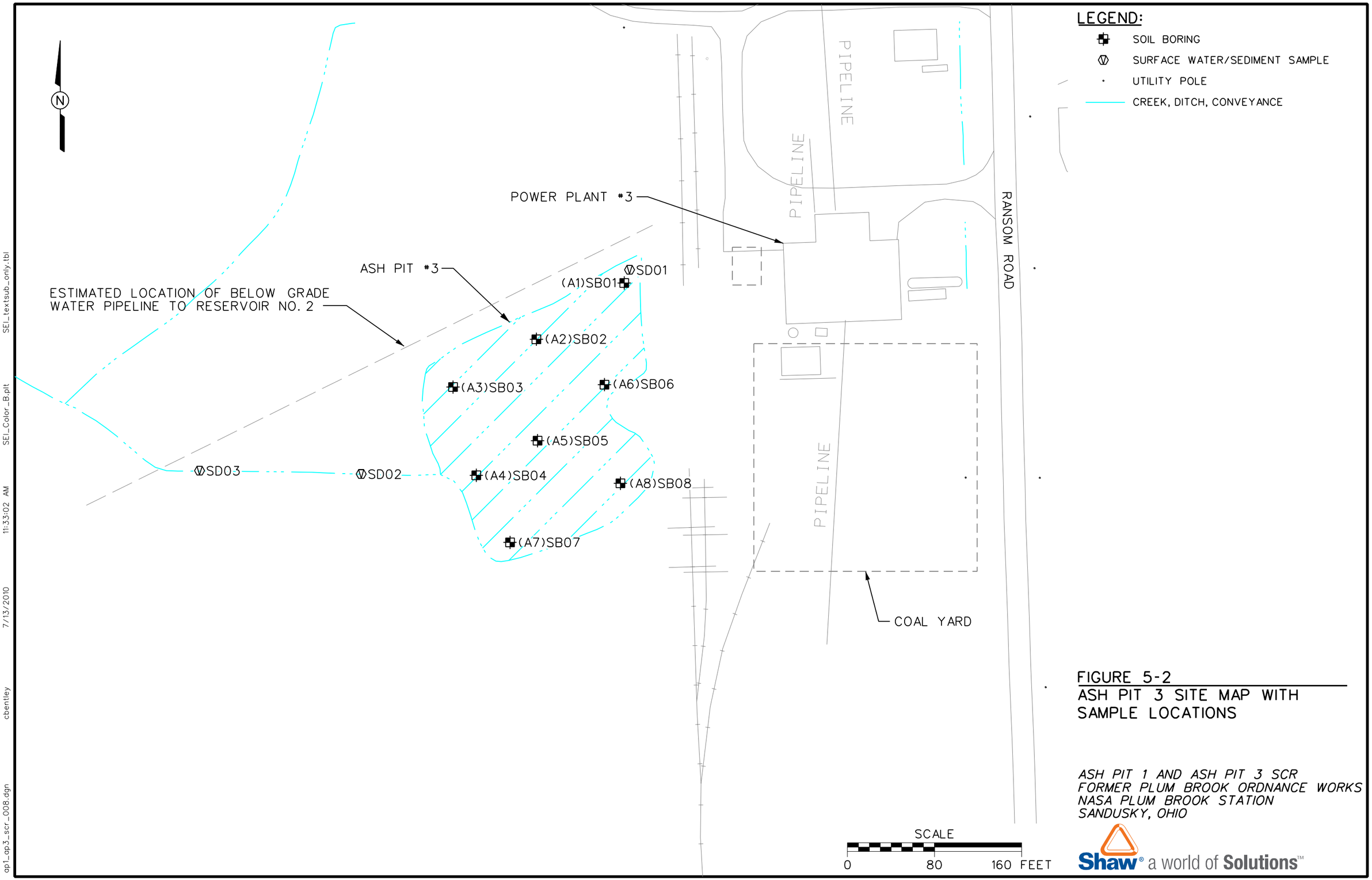

FIGURE 5-2
ASH PIT 3 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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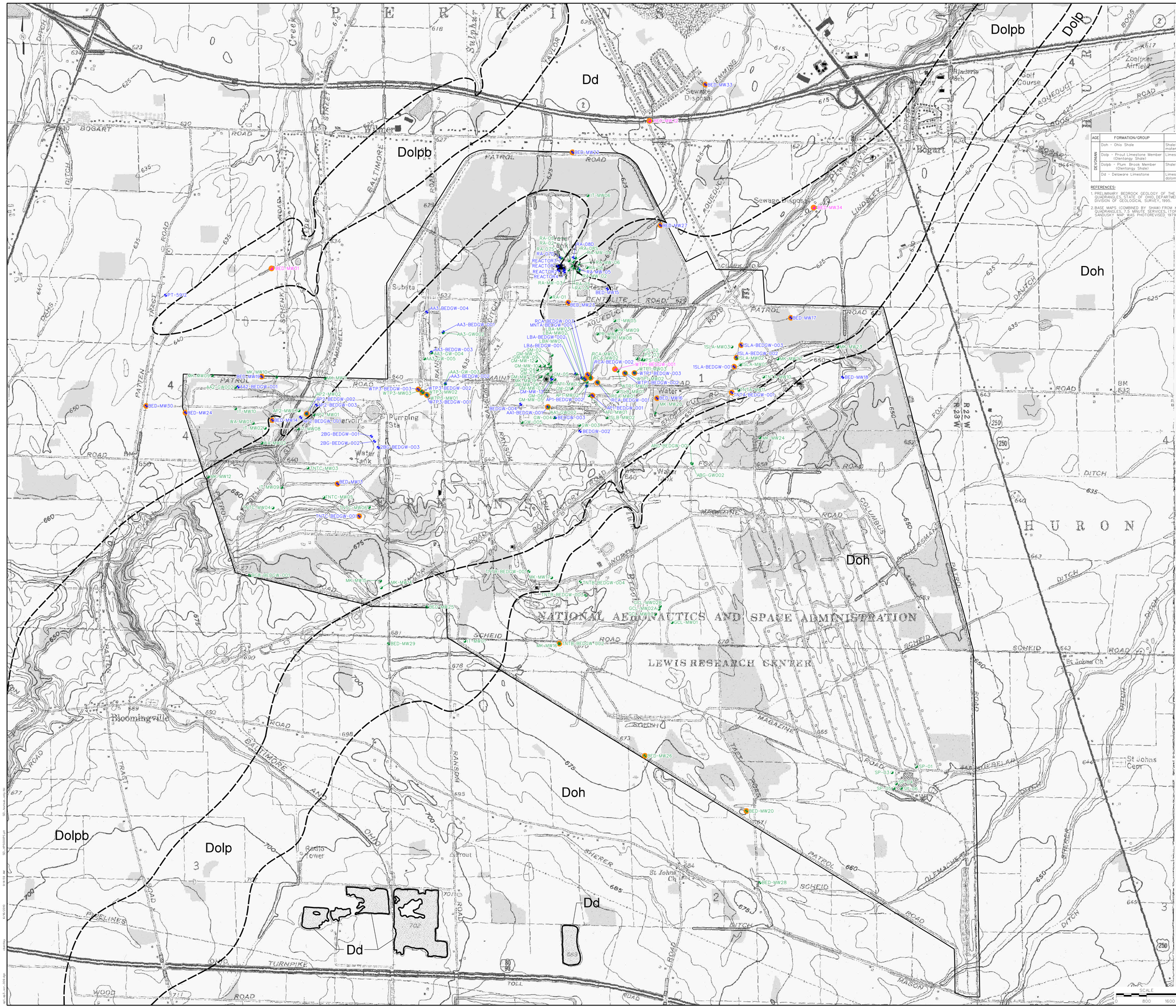

LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- ABANDONED OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- ABANDONED BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- ABANDONED BEDROCK WELL BORING
- H_2S AND/OR NATURAL GAS AND/OR PETROLEUM HYDROCARBON WERE NOTED DURING BEDROCK DRILLING
- GEOLOGIC CONTACT: SOLID WHERE EXPOSED, DASHED WHERE CONCEALED BY SEDIMENTS

AGE	FORMATION/GROUP	ROCK DESCRIPTION
DEVONIAN	Doh - Ohio Shale	Shale: black, thin-bedded with bituminous and carboneous material, pyrite, natural gas pockets.
	Dolp - Prout Limestone Member (Olentangy Shale)	Limestone: light gray, calcareous.
	Dolpb - Plum Brook Member (Olentangy Shale)	Shale: dark gray, thin-bedded.
	Dd - Delaware Limestone	Limestone: buff, earthy, interbedded with brown crystalline dolomite, fossiliferous, hydrogen sulfide, petroleum hydrocarbon.

REFERENCES:

1. PRELIMINARY BEDROCK GEOLOGY OF THE KIMBALL AND SANDUSKY, OHIO, QUADRANGLES, STATE OF OHIO, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF GEOLOGICAL SURVEY, 1995.
2. BASE MAPS (COMBINED BY SHAW) FROM KIMBALL AND SANDUSKY QUADRANGLES, 7.5 MINUTE SERVICES, (TOPOGRAPHIC), 1969. SANDUSKY MAP WAS PHOTOREVISED, 1979.

NOTES:

1. CONTACT LINES WERE ADJUSTED BASED ON 2009 MONITORING WELLS/SOIL BORING DATA.

FIGURE 5-3
REGIONAL GEOLOGIC MAP WITH WELL LOCATIONS

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

SCALE
0 800 1600 FEET

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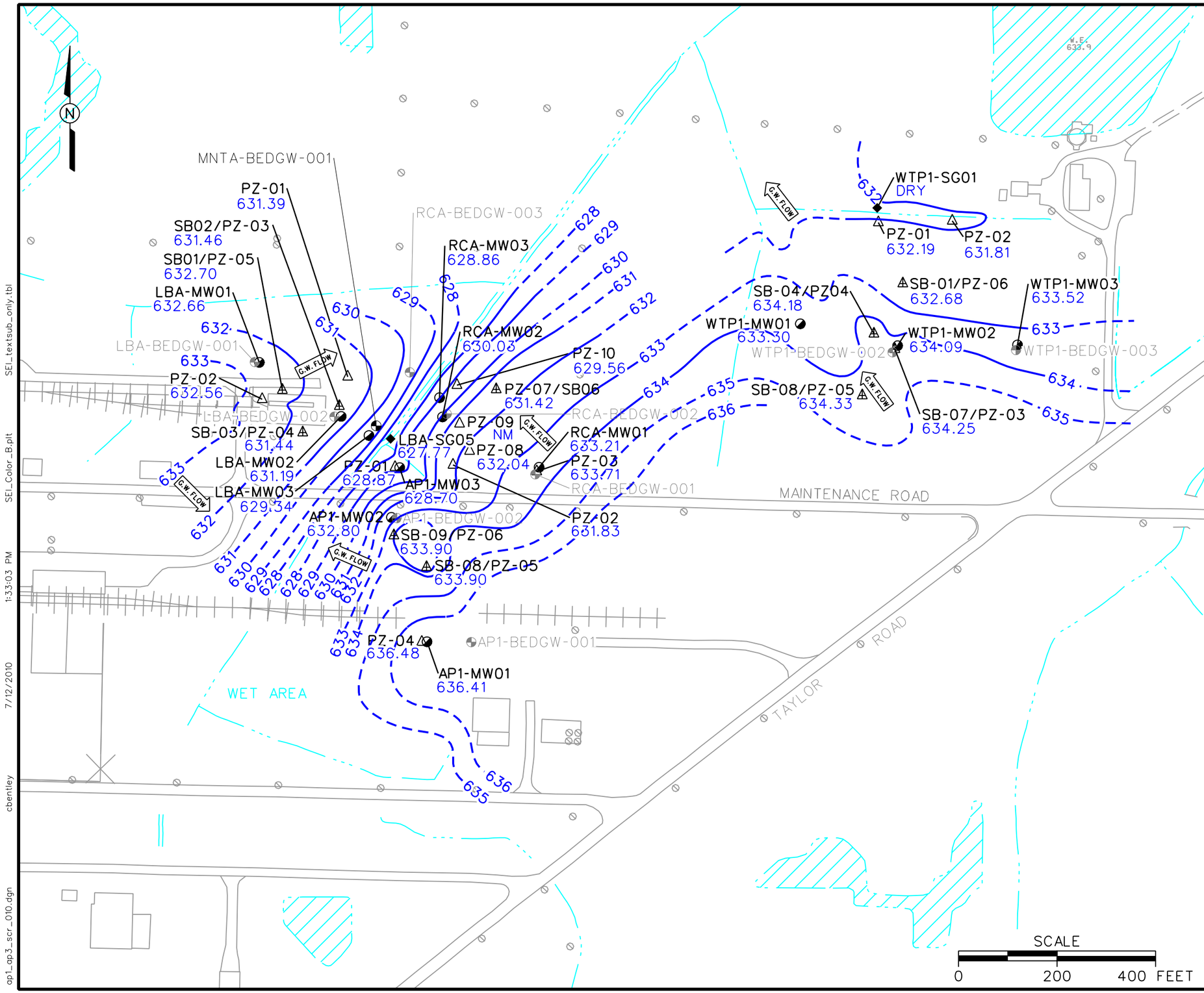

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- PIEZOMETER
- SOIL BORING/PIEZOMETER
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE (DENOTES FACILITY BOUNDARY)
- 628.85 GROUNDWATER ELEVATION (FT. MSL)
- 635 GROUNDWATER ELEV. CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- NM NOT MEASURED

FIGURE 5-4
ASH PIT 1 OVERBURDEN/SHALE GROUNDWATER ELEVATION CONTOUR MAP
(MAY 26, 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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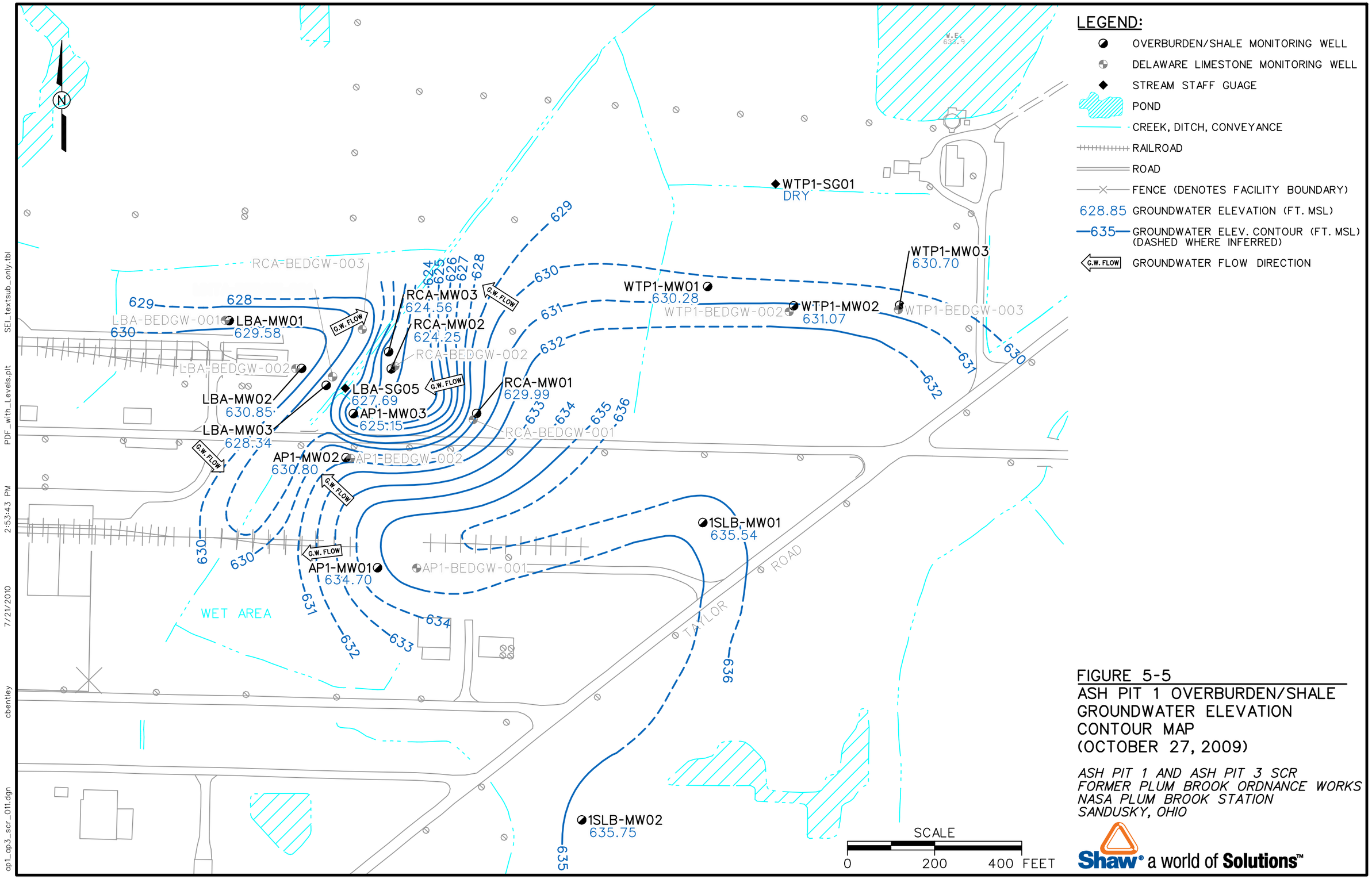

FIGURE 5-5
ASH PIT 1 OVERBURDEN/SHALE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 27, 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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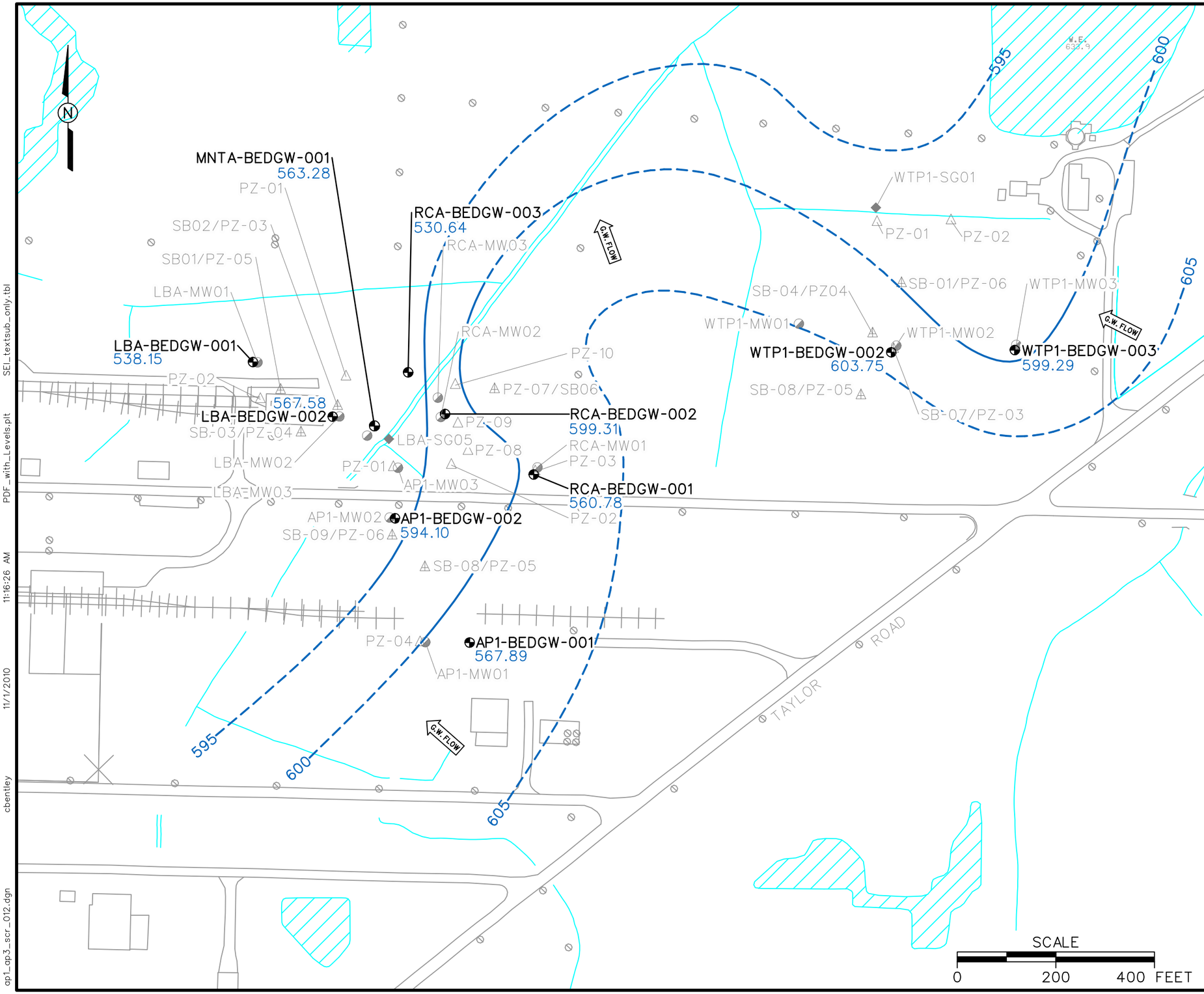

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- PIEZOMETER
- SOIL BORING/PIEZOMETER
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE (DENOTES FACILITY BOUNDARY)
- 603.75 GROUNDWATER ELEVATION (FT. MSL)
- 600 GROUNDWATER CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUNDWATER ELEVATIONS OF LBA-BEDGW-001, LBA-BEDGW-002, MNTA-BEDGW-001, RCA-BEDGW-001, AP1-BEDGW-001, AND RCA-BEDGW-003 WERE NOT USED DUE TO ELEVATIONS MUCH LOWER THAN ADJACENT WELLS THEREFORE PRODUCING CONTOURS THAT ARE INCONSISTENT WITH THE GENERAL GROUNDWATER FLOW TREND. VARIATIONS IN ELEVATION MAY BE CAUSED BY LOW-PRODUCING BEDROCK FRACTURES, WELLS SCREENED WITHIN DIFFERENT FRACTURE NETWORKS, OR NON-STATIC WATER LEVELS CAUSED BY RECENT NEARBY CORE DRILLING ACTIVITIES.

SCALE
0 200 400 FEET

FIGURE 5-6
ASH PIT 1 DELAWARE LIMESTONE GROUNDWATER ELEVATION CONTOUR MAP
(MAY 26, 2009)

ASH PIT 1 AND ASH PIT 2 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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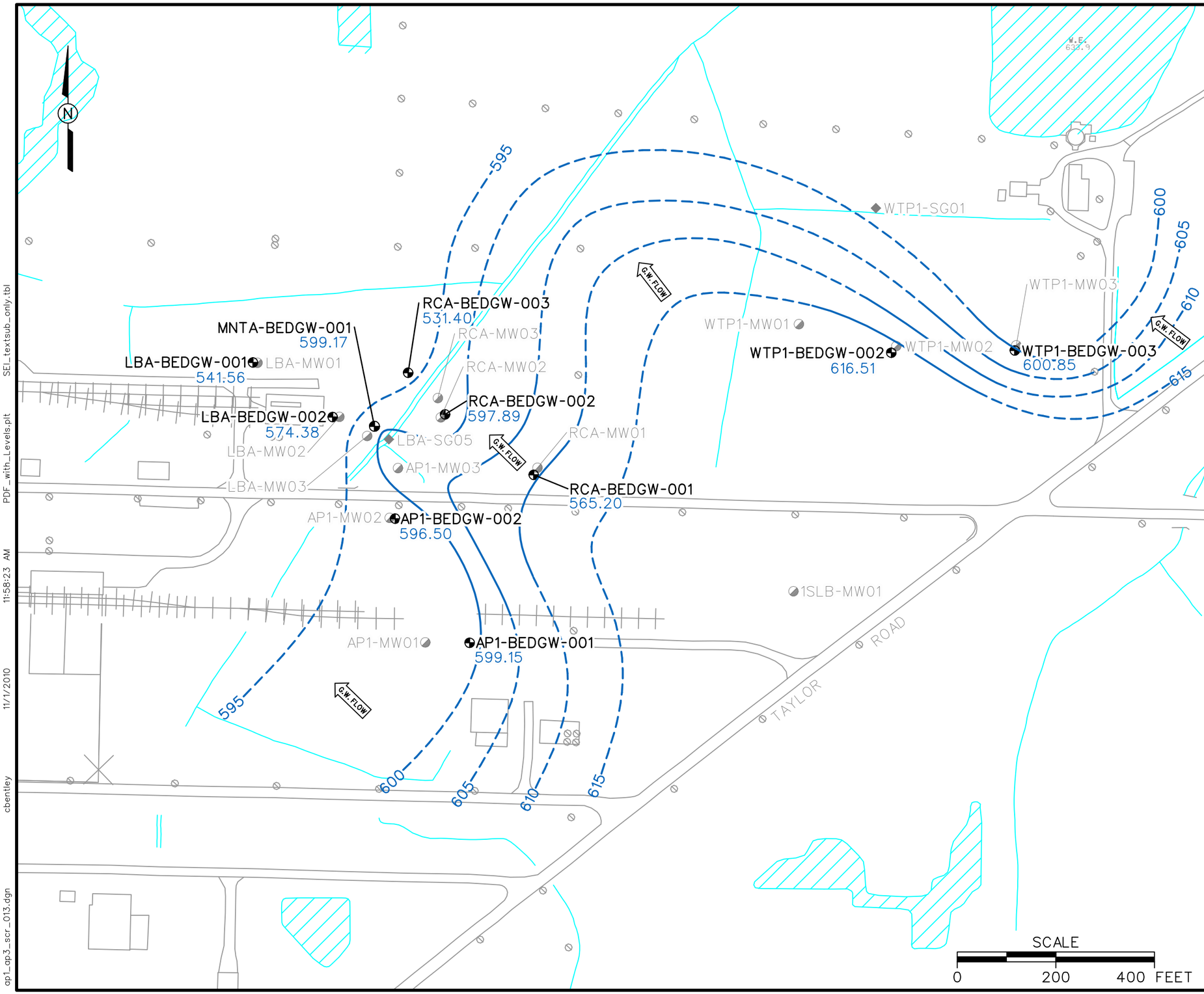

LEGEND:

- OVERBURDEN/SHALE MONITORING WELL
- DELAWARE LIMESTONE MONITORING WELL
- STREAM STAFF GUAGE
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE (DENOTES FACILITY BOUNDARY)
- 600.85 GROUNDWATER ELEVATION (FT. MSL)
- 600 GROUNDWATER CONTOUR (FT. MSL) (DASHED WHERE INFERRED)
- G.W. FLOW GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUNDWATER ELEVATIONS OF LBA-BEDGW-001, LBA-BEDGW-002, RCA-BEDGW-001, AP1-BEDGW-001, AND RCA-BEDGW-003 WERE NOT USED DUE TO ELEVATIONS MUCH LOWER THAN ADJACENT WELLS THEREFORE PRODUCING CONTOURS THAT ARE INCONSISTENT WITH THE GENERAL GROUNDWATER FLOW TREND. VARIATIONS IN ELEVATION MAY BE CAUSED BY LOW-PRODUCING BEDROCK FRACTURES OR WELLS SCREENED WITHIN DIFFERENT FRACTURE NETWORKS.

FIGURE 5-7
ASH PIT 1 DELAWARE LIMESTONE GROUNDWATER ELEVATION CONTOUR MAP (OCTOBER 27, 2009)

ASH PIT 1 AND ASH PIT 2 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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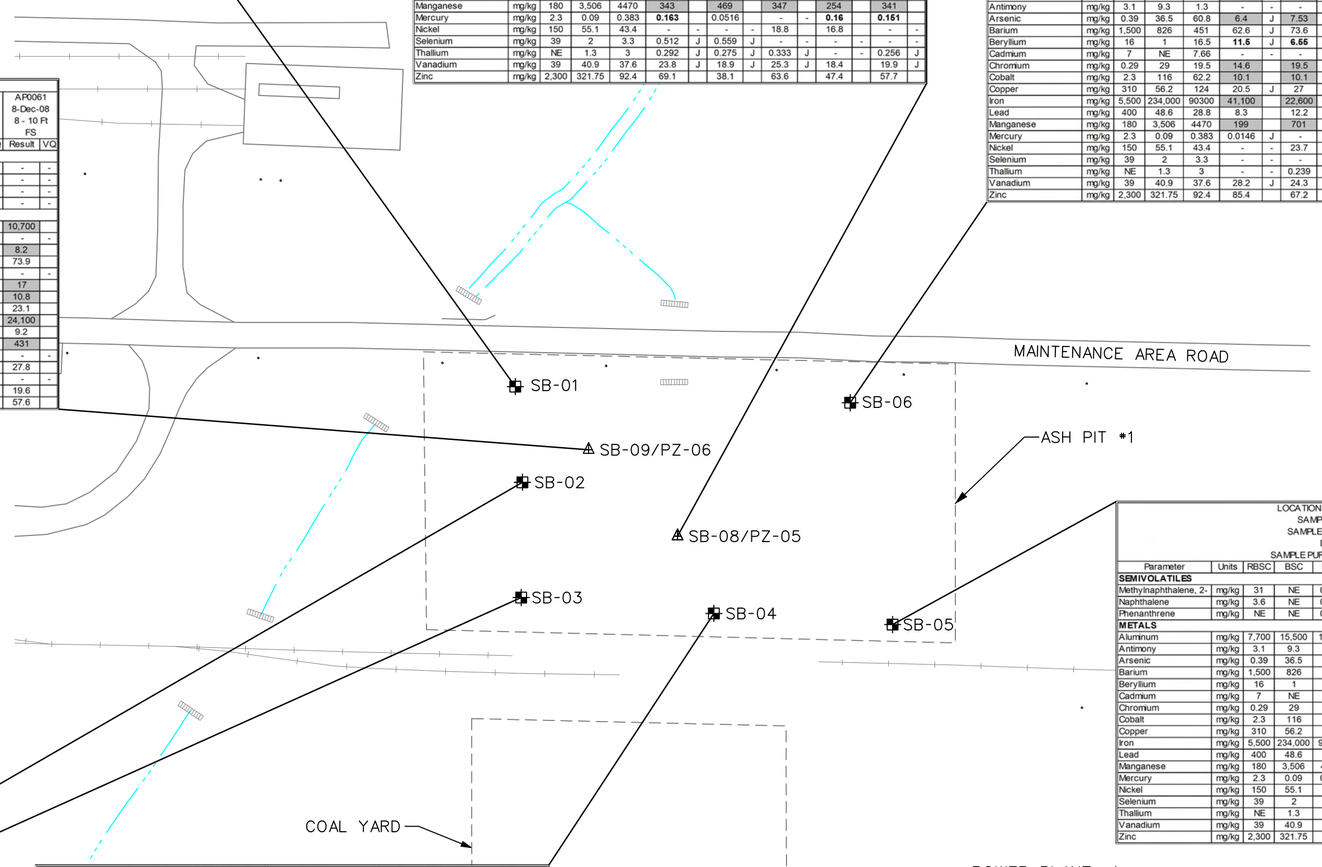

LEGEND:

- EXISTING SOIL BORING
- EXISTING SOIL BORING/PIEZOMETER
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - Q- RESULT CALCULATED FROM LINEAR REGRESSION. THE INSTRUMENT RESPONSE IS LESS THAN 20% OF THE INSTRUMENT RESPONSE OF THE LOW STANDARD OF THE CALIBRATION CURVE. PER THE ANALYTICAL METHOD, AN INSTRUMENT RESPONSE BELOW 20% OF THE LOW STANDARD FOR ANY PARTICULAR COMPOUND SHOULD BE REPORTED BY THE LAB AS NON-DETECT.

				LOCATION CODE									
				SAMPLE NO	AP0001		AP0002		AP0003				
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08				
				DEPTH	.5 - 1.5 Ft		3.5 - 5.5 Ft		8 - 10 Ft				
				SAMPLE PURPOSE	REG		REG		REG				
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ			
SEMIVOLATILES													
Fluoranthene	mg/kg	230	NE	2.06	0.0477	QJ	-	-	-	-			
Pyrene	mg/kg	170	NE	1.5	0.0378	QJ	-	-	-	-			
METALS													
Aluminum	mg/kg	7,700	15,500	13000	6,190	J	9,230	J	8,980	J			
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.258	J	-	-			
Arsenic	mg/kg	0.39	36.5	60.8	6.7	J	8.3	J	4.54	J			
Barium	mg/kg	1,500	826	451	32.7	J	37.7	J	51.5	J			
Beryllium	mg/kg	16	1	16.5	**5.74**	J	**4.87**	J	**5.82**	J			
Chromium	mg/kg	0.29	29	19.5	10.6		13.9		13.4				
Cobalt	mg/kg	2.3	116	62.2	5.47		6.18		9.22				
Copper	mg/kg	310	56.2	124	15.4	J	25.4	J	27.6	J			
Iron	mg/kg	5,500	234,000	90300	17,200		15,600		20,200				
Lead	mg/kg	400	48.6	28.8	6.61		12.3		10.9				
Manganese	mg/kg	180	3,506	4470	263		251		524				
Mercury	mg/kg	2.3	0.09	0.383	-	-	-	-	0.0162	J			
Nickel	mg/kg	150	55.1	43.4	3.93	J	13.3	J	16.9	J			
Thallium	mg/kg	NE	1.3	3	-	-	0.366	J	0.271	J			
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.3	J	20.9	J			
Zinc	mg/kg	2,300	321.75	92.4	44.4		57.1		58.7				
GENERAL CHEMISTRY													
Total organic carbon	mg/kg	NE	NE	55.3	55.3	J							

				LOCATION CODE									
				SAMPLE NO	AP0023		AP0024		AP0025		AP0057		AP0063
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft		0 - 1 Ft		0 - 1 Ft
				SAMPLE PURPOSE	REG		REG		REG		FS		FD
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Acenaphthylene	mg/kg	NE	NE	0.31	0.31	J	-	-	-	-	-	-	0.247	J
Anthracene	mg/kg	1,700	NE	0.231	0.231	J	-	-	-	-	-	-	0.2	J
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	1.02	J	0.0642	J	-	-	0.58		0.691	J
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	0.839	J	0.0534	J	-	-	0.55		0.603	J
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	1.34	J	0.0829	J	-	-	0.77		1.07	J
Chrysene	mg/kg	15	NE	0.989	0.989	J	0.0675	J	-	-	0.58		0.711	J
Fluoranthene	mg/kg	230	NE	2.06	2.06	J	0.126	J	-	-	1.3		1.69	J
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	1.95	J	0.312	J	-	-	-	-	1.68	J
Naphthalene	mg/kg	3.6	NE	0.764	0.299	J	0.0553	J	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.796	J	0.075	J	-	-	0.51		0.866	J
Pyrene	mg/kg	170	NE	1.5	1.5	J	0.102	J	-	-	0.96		1.14	J
PCBs														
Aroclor 1260	mg/kg	0.22	NE	0.101	0.101	J	-	-			-	-	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	7,200		6,700	J	11,700		9,080		7,910	
Antimony	mg/kg	3.1	9.3	1.3	0.897		0.348	J	0.26	J	-	-	0.779	
Arsenic	mg/kg	0.39	36.5	60.8	10.7		9.98	J	5.65		12.6		11.2	
Barium	mg/kg	1,500	826	451	89.5		109		42.3		76.5		79.3	
Beryllium	mg/kg	16	1	16.5	**12**	J	**11.6**	J	**7.18**	J	-	-	**10.2**	J
Cadmium	mg/kg	7	NE	7.66	0.279	J	-	-	-	-	0.82			-
Chromium	mg/kg	0.29	29	19.5	10.8		8.34		17		11.6		15.2	
Cobalt	mg/kg	2.3	116	62.2	7.28		5.37		10.1		6.7		6.15	
Copper	mg/kg	310	56.2	124	30.7		21.3		28.4		30.7		33.1	
Iron	mg/kg	5,500	234,000	90300	45,900		47,000		24,400		44,200		47,100	
Lead	mg/kg	400	48.6	28.8	28.8		9.36		13.6		19.6		25.3	
Manganese	mg/kg	180	3,506	4470	343		469		347		254		341	
Mercury	mg/kg	2.3	0.09	0.383	**0.163**		0.0516		-	-	**0.16**		**0.151**	
Nickel	mg/kg	150	55.1	43.4	-	-	-	-	18.8		16.8		-	-
Selenium	mg/kg	39	2	3.3	0.512	J	0.559	J	-	-	-		-	-
Thallium	mg/kg	NE	1.3	3	0.292	J	0.275	J	0.333	J	-	-	0.256	J
Vanadium	mg/kg	39	40.9	37.6	23.8	J	18.9	J	25.3	J	18.4		19.9	J
Zinc	mg/kg	2,300	321.75	92.4	69.1		38.1		63.6		47.4		57.7	

				LOCATION CODE									
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				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08		8-Dec-08
				DEPTH	0 - 1 Ft		3 - 4 Ft		8 - 10 Ft		8 - 10 Ft		8 - 10 Ft
				SAMPLE PURPOSE	REG		REG		REG		FD		FS
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Dibenzofuran	mg/kg	7.8	NE	0.0757	0.0757	QJ	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.363	QJ	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.764	0.247	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.156	J	-	-	0.0778	J	0.0887	J	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	7,650	J	7,640	J	8,650	J	8,130	J	10,700	
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	12.6	J	5.13	J	9.16	J	9.95	J	8.2	
Barium	mg/kg	1,500	826	451	84.9	J	39	J	41.1	J	37.6	J	73.9	
Beryllium	mg/kg	16	1	16.5	**8.94**	J	**6.85**	J	**7.08**	J	**6.73**	J	-	-
Chromium	mg/kg	0.29	29	19.5	10.7		11.7		13.5		12		17	
Cobalt	mg/kg	2.3	116	62.2	6.2		8.95		10.7		10.3		10.8	
Copper	mg/kg	310	56.2	124	18.2	J	26.6	J	30.1	J	31.4	J	23.1	
Iron	mg/kg	5,500	234,000	90300	26,500		20,600		24,200		24,200		24,100	
Lead	mg/kg	400	48.6	28.8	6.28		9		12.3		11.5		9.2	
Manganese	mg/kg	180	3,506	4470	2,810		506		433		473		431	
Mercury	mg/kg	2.3	0.09	0.383	0.0383		0.0124	J	0.0142	J	0.0146	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	13.5	J	17.1	J	17.2	J	27.8	
Thallium	mg/kg	NE	1.3	3	-	-	-	-	0.349	J	0.446	J	-	-
Vanadium	mg/kg	39	40.9	37.6	20.7	J	19.1	J	16.4	J	16.6	J	19.6	
Zinc	mg/kg	2,300	321.75	92.4	34.8		63.3		82.4		68.6		57.6	

				LOCATION CODE									
				SAMPLE NO	AP0017		AP0018		AP0019				
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08				
				DEPTH	.8 - 1.8 Ft		5 - 5.8 Ft		8 - 10 Ft				
				SAMPLE PURPOSE	REG		REG		REG				
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ			
METALS													
Aluminum	mg/kg	7,700	15,500	13000	10,500	J	13,000	J	8,870	J			
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-	0.287	J			
Arsenic	mg/kg	0.39	36.5	60.8	6.4	J	7.53	J	10.4	J			
Barium	mg/kg	1,500	826	451	62.6	J	73.6	J	32.6	J			
Beryllium	mg/kg	16	1	16.5	**11.5**	J	**6.55**	J	**6.71**	J			
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	7.66				
Chromium	mg/kg	0.29	29	19.5	14.6		19.5		13.4				
Cobalt	mg/kg	2.3	116	62.2	10.1		10.1		11.2				
Copper	mg/kg	310	56.2	124	20.5	J	27	J	32.7	J			
Iron	mg/kg	5,500	234,000	90300	41,100		22,600		23,000				
Lead	mg/kg	400	48.6	28.8	8.3		12.2		13.1				
Manganese	mg/kg	180	3,506	4470	199		701		373				
Mercury	mg/kg	2.3	0.09	0.383	0.0146	J	-	-	0.0148	J			
Nickel	mg/kg	150	55.1	43.4	-	-	23.7	J	21.2	J			
Selenium	mg/kg	39	2	3.3	-	-	-	-	0.761	J			
Thallium	mg/kg	NE	1.3	3	-	-	0.239	J	0.663				
Vanadium	mg/kg	39	40.9	37.6	28.2	J	24.3	J	17	J			
Zinc	mg/kg	2,300	321.75	92.4	85.4		67.2		78				

				LOCATION CODE									
				SAMPLE NO	AP0004		AP0005		AP0006				
				SAMPLE DATE	8-Dec-08		8-Dec-08		8-Dec-08				
				DEPTH	0 - 1 Ft		3 - 3.8 Ft		8 - 10 Ft				
				SAMPLE PURPOSE	REG		REG		REG				
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ			
METALS													
Aluminum	mg/kg	7,700	15,500	13000	9,360	J	8,380	J	7,780	J			
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.294	J	-	-			
Arsenic	mg/kg	0.39	36.5	60.8	9.14	J	6.17	J	4.3	J			
Barium	mg/kg	1,500	826	451	83.3	J	35.9	J	56.1	J			
Beryllium	mg/kg	16	1	16.5	**10.8**	J	**6.99**	J	**6.23**	J			
Cadmium	mg/kg	7	NE	7.66	-	-	0.345	J	-	-			
Chromium	mg/kg	0.29	29	19.5	12.4		11.9		11.5				
Cobalt	mg/kg	2.3	116	62.2	8.57		9.76		8.14				
Copper	mg/kg	310	56.2	124	27.3	J	37.7	J	24.4	J			
Iron	mg/kg	5,500	234,000	90300	36,500		21,500		18,000				
Lead	mg/kg	400	48.6	28.8	9.65		14.6		11.4				
Manganese	mg/kg	180	3,506	4470	306		543		472				
Mercury	mg/kg	2.3	0.09	0.383	0.0357		0.0196	J	0.0159	J			
Nickel	mg/kg	150	55.1	43.4	-	-	18.7	J	15	J			
Selenium	mg/kg	39	2	3.3	0.618	J	-	-	-	-			
Thallium	mg/kg	NE	1.3	3	-	-	0.343	J	-	-			
Vanadium	mg/kg	39	40.9	37.6	26.3	J	20.6	J	20.3	J			
Zinc	mg/kg	2,300	321.75	92.4	55.2		72.7		55.4				

				LOCATION CODE									
				SAMPLE NO	AP0014		AP0015		AP0016				
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08				
				DEPTH	0 - 1 Ft		3 - 3.7 Ft		8 - 9 Ft				
				SAMPLE PURPOSE	REG		REG		REG				
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ			
SEMIVOLATILES													
Methylnaphthalene, 2-	mg/kg	31	NE	0.942	0.942	J	-	-	-	-			
Naphthalene	mg/kg	3.6	NE	0.764	0.764	J	-	-	-	-			
Phenanthrene	mg/kg	NE	NE	0.866	0.275	J	-	-	-	-			
METALS													
Aluminum	mg/kg	7,700	15,500	13000	10,700		6,260		8,810				
Antimony	mg/kg	3.1	9.3	1.3	0.416	J	-	-	0.276	J			
Arsenic	mg/kg	0.39	36.5	60.8	9.06		11.6		5.78				
Barium	mg/kg	1,500	826	451	82.7		168		45.5				
Beryllium	mg/kg	16	1	16.5	**13.6**	J	**12.9**	J	**7**	J			
Cadmium	mg/kg	7	NE	7.66	-	-	0.269	J	-	-			
Chromium	mg/kg	0.29	29	19.5	16.4		13.5		13.7				
Cobalt	mg/kg	2.3	116	62.2	8.36		20.5		10.3				
Copper	mg/kg	310	56.2	124	47.9		10.4		29.2				
Iron	mg/kg	5,500	234,000	90300	64,800		62,000		23,600				
Lead	mg/kg	400	48.6	28.8	12.3		5.69		12				
Manganese	mg/kg	180	3,506	4470	305		954		484				
Mercury	mg/kg	2.3	0.09	0.383	0.0756		0.0592		0.0222	J			
Nickel	mg/kg	150	55.1	43.4	-	-	-	-	16.1				
Selenium	mg/kg	39	2	3.3	0.592	J	-	-	-	-			
Thallium	mg/kg	NE	1.3	3	0.303	J	-	-	0.405	J			
Vanadium	mg/kg	39	40.9	37.6	27.9	J	37.6	J	24.2	J			
Zinc	mg/kg	2,300	321.75	92.4	62.8		92.4		65.4				

				LOCATION CODE									
				SAMPLE NO	AP0007		AP0008		AP0009				
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08				
				DEPTH	0 - 1 Ft		3 - 5 Ft		8 - 10 Ft				
				SAMPLE PURPOSE	REG		REG		REG				
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ			
METALS													
Aluminum	mg/kg	7,700	15,500	13000	9,940		2,770		8,470				
Antimony	mg/kg	3.1	9.3	1.3	0.347	J	-	-	0.267	J			
Arsenic	mg/kg	0.39	36.5	60.8	13.2		5.62		6.7				
Barium	mg/kg	1,500	826	451	107		13		46.7				
Beryllium	mg/kg	16	1	16.5	**13.9**	J	**3.62**	J	**6.49**	J			
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	0.277	J			
Chromium	mg/kg	0.29	29	19.5	13.6		5.51		11.7				
Cobalt	mg/kg	2.3	116	62.2	9.92		3.23		8.43				
Copper	mg/kg	310	56.2	124	30.5		7.71		27.3				
Iron	mg/kg	5,500	234,000	90300	63,100		10,600		18,900				
Lead	mg/kg	400	48.6	28.8	9.59		7.75		12.3				
Manganese	mg/kg	180	3,506	4470	252		266		470				
Mercury	mg/kg	2.3	0.09	0.383	**0.0928**		-	-	0.0151	J			
Nickel	mg/kg	150	55.1	43.4	-	-	1.71		14.7				
Selenium	mg/kg	39	2	3.3	0.567	J	-	-	-	-			
Thallium	mg/kg	NE	1.3	3	0.563		-	-	0.301	J			
Vanadium	mg/kg	39	40.9	37.6	29.9	J	15.1	J	20.5	J			
Zinc	mg/kg	2,300	321.75	92.4	57.1		23.1		54.1				

				LOCATION CODE									
				SAMPLE NO	AP0010		AP0011		AP0012		AP0013		AP0062
				SAMPLE DATE	9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08		9-Dec-08
				DEPTH	0 - 1 Ft		3 - 4 Ft		3 - 4 Ft		8 - 10 Ft		3 - 4 Ft
				SAMPLE PURPOSE	REG		REG		FD		REG		FS
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES														
Naphthalene	mg/kg	3.6	NE	0.764	0.0661	J	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.055	J	-	-	-	-	-	-	-	-
METALS														
Aluminum	mg/kg	7,700	15,500	13000	12,700		7,340		6,910		10,200		6,680	
Antimony	mg/kg	3.1	9.3	1.3	0.352	J	-	-	-	-	0.304	J	-	-
Arsenic	mg/kg	0.39	36.5	60.8	11.7		3.72		3.42		8.59		6.2	
Barium	mg/kg	1,500	826	451	105		52.8		132		451		42.8	
Beryllium	mg/kg	16	1	16.5	**16.6**	J	**6.43**	J	**8.18**	J	-	-	-	-
Cadmium	mg/kg	7	NE	7.66	-	-	0.25	J	0.313	J	0.276	J	-	-
Chromium	mg/kg	0.29	29	19.5	12		11.7		11.5		17.7		11	
Cobalt	mg/kg	2.3	116	62.2	8.92		26.8		28.9		62.2		27.4	
Copper	mg/kg	310	56.2	124	50		9.5		11.3		30.7		7.9	
Iron	mg/kg	5,500	234,000	90300	90,300		18,700		27,400		32,800		21,900	
Lead	mg/kg	400	48.6	28.8	11.3		7.25		8.13		19.2		6.8	
Manganese	mg/kg	180	3,506	4470	241		871		1,240		**4,470**		556	
Mercury	mg/kg	2.3	0.09	0.383	**0.383**		0.0305		0.0301		0.0195	J	-	-
Nickel	mg/kg	150	55.1	43.4	-	-	14.4		8.92		43.4		27.9	
Selenium	mg/kg	39	2	3.3	0.6	J	-	-	-	-	-	-	-	-
Thallium	mg/kg	NE	1.3	3	0.356	J	-	-	-	-	0.354	J	-	-
Vanadium	mg/kg	39	40.9	37.6	32.4	J	22	J	26.1	J	29.3	J	20.5	
Zinc	mg/kg	2,300	321.75	92.4	55.3		63.4		75.1		87		60.7	

SCALE

0 80 160 FEET

FIGURE 5-8
DETECTED CONSTITUENTS AT ASH PIT 1 IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2008)

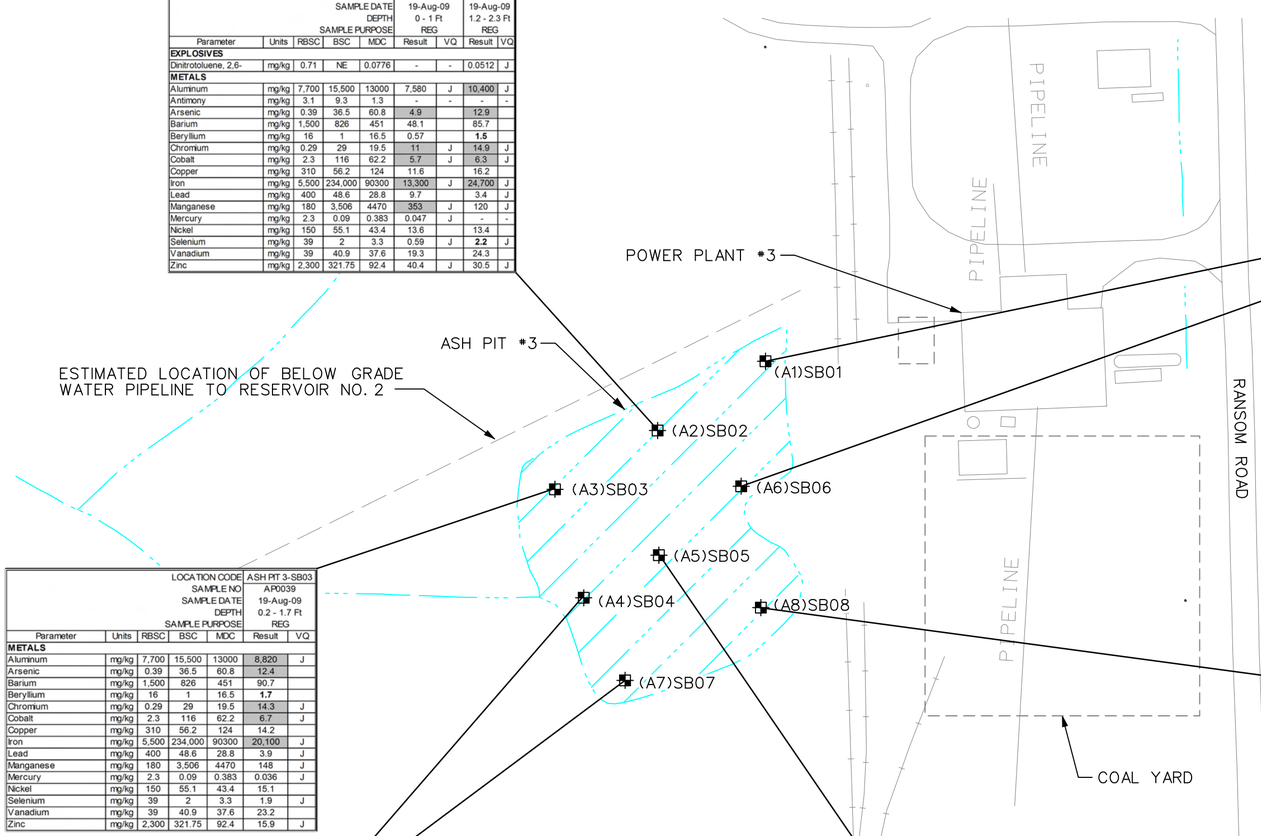
ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

op1_op3_scr_014.dgn cbentley 11/4/2010 9:02:46 AM POF_with_Levels.plt SEL_textsub_only.tbl

LEGEND:

- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED



				LOCATION CODE	ASH PIT 3-SB02			
				SAMPLE NO	AP0036		AP0037	
				SAMPLE DATE	19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		1.2 - 2.3 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	-	-	0.0512	J
METALS								
Aluminum	mg/kg	7,700	15,500	13000	7,580	J	10,400	J
Antimony	mg/kg	3.1	9.3	1.3	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	4.9		12.9	
Barium	mg/kg	1,500	826	451	48.1		85.7	
Beryllium	mg/kg	16	1	16.5	0.57		**1.5**	
Chromium	mg/kg	0.29	29	19.5	11	J	14.9	J
Cobalt	mg/kg	2.3	116	62.2	5.7	J	6.3	J
Copper	mg/kg	310	56.2	124	11.6		16.2	
Iron	mg/kg	5,500	234,000	90300	13,300	J	24,700	J
Lead	mg/kg	400	48.6	28.8	9.7		3.4	J
Manganese	mg/kg	180	3,506	4470	353	J	120	J
Mercury	mg/kg	2.3	0.09	0.383	0.047	J	-	-
Nickel	mg/kg	150	55.1	43.4	13.6		13.4	
Selenium	mg/kg	39	2	3.3	0.59	J	**2.2**	J
Vanadium	mg/kg	39	40.9	37.6	19.3		24.3	
Zinc	mg/kg	2,300	321.75	92.4	40.4	J	30.5	J

				LOCATION CODE	ASH PIT 3-SB01			
				SAMPLE NO	AP0032		AP0033	
				SAMPLE DATE	19-Aug-09		19-Aug-09	
				DEPTH	0 - 1 Ft		3 - 5 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0563	J	-	-
SEMIVOLATILES								
Acenaphthylene	mg/kg	NE	NE	0.31	0.0516	J	-	-
Benzo(a)anthracene	mg/kg	0.15	NE	1.02	0.156	J	-	-
Benzo(a)pyrene	mg/kg	0.015	NE	0.839	0.168	J	-	-
Benzo(b)fluoranthene	mg/kg	0.15	NE	1.34	0.268		-	-
Benzo(ghi)perylene	mg/kg	NE	NE	0.0882	0.0882	J	-	-
Benzo(k)fluoranthene	mg/kg	1.5	NE	0.0972	0.0972	J	-	-
Chrysene	mg/kg	15	NE	0.989	0.19	J	-	-
Fluoranthene	mg/kg	230	NE	2.06	0.401		-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	NE	1.95	0.0914	J	-	-
Phenanthrene	mg/kg	NE	NE	0.866	0.107	J	-	-
Pyrene	mg/kg	170	NE	1.5	0.273		-	-
PCBs								
Aroclor 1260	mg/kg	0.22	NE	0.101	0.015	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	5,060	J	7,010	J
Arsenic	mg/kg	0.39	36.5	60.8	7.7		5	
Barium	mg/kg	1,500	826	451	59		41.2	
Beryllium	mg/kg	16	1	16.5	0.69		0.5	
Cadmium	mg/kg	7	NE	7.66	0.33		0.18	J
Chromium	mg/kg	0.29	29	19.5	8.8	J	10.3	J
Cobalt	mg/kg	2.3	116	62.2	4.5	J	6.7	J
Copper	mg/kg	310	56.2	124	**124**		18.4	
Iron	mg/kg	5,500	234,000	90300	12,400	J	14,500	J
Lead	mg/kg	400	48.6	28.8	16.5		9.3	J
Manganese	mg/kg	180	3,506	4470	99.2	J	410	J
Mercury	mg/kg	2.3	0.09	0.383	**0.15**		0.015	J
Nickel	mg/kg	150	55.1	43.4	13		17.1	
Selenium	mg/kg	39	2	3.3	1.1	J	0.84	J
Vanadium	mg/kg	39	40.9	37.6	14.1		16.3	
Zinc	mg/kg	2,300	321.75	92.4	70.5	J	44.7	J

				LOCATION CODE	ASH PIT 3-SB06					
				SAMPLE NO	AP0048		AP0049		AP0061A	
				SAMPLE DATE	20-Aug-09		20-Aug-09		20-Aug-09	
				DEPTH	0.2 - 1 Ft		1 - 2 Ft		2 - 2.7 Ft	
				SAMPLE PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
METALS										
Aluminum	mg/kg	7,700	15,500	13000	8,770		11,400		7,840	
Antimony	mg/kg	3.1	9.3	1.3	1.2	J	1.3	J	0.93	J
Arsenic	mg/kg	0.39	36.5	60.8	12.7		16.7		30.6	
Barium	mg/kg	1,500	826	451	203		113		65.1	
Beryllium	mg/kg	16	1	16.5	0.74		0.92		0.56	
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	0.17	J
Chromium	mg/kg	0.29	29	19.5	9.6		12		11.8	
Cobalt	mg/kg	2.3	116	62.2	4.5		6.3		8.5	
Copper	mg/kg	310	56.2	124	21.6		26.5		17.6	
Iron	mg/kg	5,500	234,000	90300	68,300		67,800		20,500	
Lead	mg/kg	400	48.6	28.8	4.5	J	7	J	10	J
Manganese	mg/kg	180	3,506	4470	54.5		81.7		402	
Mercury	mg/kg	2.3	0.09	0.383	-	-	0.037	J	0.016	J
Nickel	mg/kg	150	55.1	43.4	11.5		16		18.8	
Selenium	mg/kg	39	2	3.3	1.4	J	1.5	J	**2.1**	J
Thallium	mg/kg	NE	1.3	3	**3**		**2.9**		-	-
Vanadium	mg/kg	39	40.9	37.6	15.1		19.5		17.7	
Zinc	mg/kg	2,300	321.75	92.4	17.2		31.3		49.3	

				LOCATION CODE	ASH PIT 3-SB03
				SAMPLE NO	AP0039
				SAMPLE DATE	19-Aug-09
				DEPTH	0.2 - 1.7 Ft
				SAMPLE PURPOSE	REG
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS						
Aluminum	mg/kg	7,700	15,500	13000	8,820	J
Arsenic	mg/kg	0.39	36.5	60.8	12.4	
Barium	mg/kg	1,500	826	451	90.7	
Beryllium	mg/kg	16	1	16.5	**1.7**	
Chromium	mg/kg	0.29	29	19.5	14.3	J
Cobalt	mg/kg	2.3	116	62.2	6.7	J
Copper	mg/kg	310	56.2	124	14.2	
Iron	mg/kg	5,500	234,000	90300	20,100	J
Lead	mg/kg	400	48.6	28.8	3.9	J
Manganese	mg/kg	180	3,506	4470	148	J
Mercury	mg/kg	2.3	0.09	0.383	0.036	J
Nickel	mg/kg	150	55.1	43.4	15.1	
Selenium	mg/kg	39	2	3.3	1.9	J
Vanadium	mg/kg	39	40.9	37.6	23.2	
Zinc	mg/kg	2,300	321.75	92.4	15.9	J

				LOCATION CODE	ASH PIT 3-SB08							
				SAMPLE NO	AP0054		AP0056		AP0057A		AP0055	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 1 Ft		0.3 - 1 Ft		0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
EXPLOSIVES												
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0547	J	0.0776	J	-	-	-	-
METALS												
Aluminum	mg/kg	7,700	15,500	13000	7,540		10,400		9,390		8,970	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.88	J	-	-	0.5	J
Arsenic	mg/kg	0.39	36.5	60.8	27.3		**60.8**		35.2		32.7	
Barium	mg/kg	1,500	826	451	83.5		110		93.6		98.4	
Beryllium	mg/kg	16	1	16.5	**1.6**		**2**		-	-	0.64	
Cadmium	mg/kg	7	NE	7.66	-	-	-	-	-	-	0.14	J
Chromium	mg/kg	0.29	29	19.5	14.3		18.8		17.5		12.6	
Cobalt	mg/kg	2.3	116	62.2	7.6		8.1		-	-	12.2	
Copper	mg/kg	310	56.2	124	20.5		27.6		29.1		20.9	
Iron	mg/kg	5,500	234,000	90300	28,400		50,200		38,300		28,300	
Lead	mg/kg	400	48.6	28.8	6.7	J	9.8	J	12.2		8.6	
Manganese	mg/kg	180	3,506	4470	280		253		282		1,270	
Mercury	mg/kg	2.3	0.09	0.383	0.079	J	0.071	J	-	-	0.029	J
Nickel	mg/kg	150	55.1	43.4	17.9		20.7		28.5		31.9	
Selenium	mg/kg	39	2	3.3	**2.2**	J	**3.3**	J	**2.5**		0.66	J
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	0.5	J
Vanadium	mg/kg	39	40.9	37.6	24.3		33.5		27.4		20.3	
Zinc	mg/kg	2,300	321.75	92.4	27.2		40.8		43.3		50.6	

				LOCATION CODE	ASH PIT 3-SB04			
				SAMPLE NO	AP0042		AP0043	
				SAMPLE DATE	21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 0.8 Ft		0.8 - 1.5 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
PCBs								
Aroclor 1260	mg/kg	0.22	NE	0.101	0.043	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	8,240		4,870	
Arsenic	mg/kg	0.39	36.5	60.8	29		8.5	
Barium	mg/kg	1,500	826	451	127		41.5	
Beryllium	mg/kg	16	1	16.5	**2.1**		0.4	
Cadmium	mg/kg	7	NE	7.66	0.3	J	0.2	J
Chromium	mg/kg	0.29	29	19.5	15.5		7.7	
Cobalt	mg/kg	2.3	116	62.2	8.9		5.9	
Copper	mg/kg	310	56.2	124	43.6		15	
Iron	mg/kg	5,500	234,000	90300	24,000		11,200	
Lead	mg/kg	400	48.6	28.8	20.4		8.1	J
Manganese	mg/kg	180	3,506	4470	322		362	
Mercury	mg/kg	2.3	0.09	0.383	**0.13**	J	0.014	J
Nickel	mg/kg	150	55.1	43.4	22.9		14.3	
Selenium	mg/kg	39	2	3.3	**2.9**	J	1.1	J
Vanadium	mg/kg	39	40.9	37.6	28.4		13.3	
Zinc	mg/kg	2,300	321.75	92.4	68.3		37	

				LOCATION CODE	ASH PIT 3-SB07							
				SAMPLE NO	AP0051		AP0052		AP0059		AP0060	
				SAMPLE DATE	21-Aug-09		21-Aug-09		21-Aug-09		21-Aug-09	
				DEPTH	0 - 1 Ft		1 - 2 Ft		1 - 2 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG		FD		FS	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ
METALS												
Aluminum	mg/kg	7,700	15,500	13000	4,760		9,910		9,620		8,630	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.72	J	-	-	-	-
Arsenic	mg/kg	0.39	36.5	60.8	7.7		9.3		6.9		7	
Barium	mg/kg	1,500	826	451	38.5		70.5		70.1		77.2	
Beryllium	mg/kg	16	1	16.5	0.41	J	0.67		0.63		-	-
Cadmium	mg/kg	7	NE	7.66	0.44		0.21	J	0.19	J	-	-
Chromium	mg/kg	0.29	29	19.5	6.9		15		14.5		14.8	
Cobalt	mg/kg	2.3	116	62.2	5		8.1		7.3		8.4	
Copper	mg/kg	310	56.2	124	38.9		21.7		19.4		15.4	
Iron	mg/kg	5,500	234,000	90300	15,200		17,700		14,900		17,500	
Lead	mg/kg	400	48.6	28.8	12.2		11.9	J	11.2	J	9.5	
Manganese	mg/kg	180	3,506	4470	217		477		460		498	
Mercury	mg/kg	2.3	0.09	0.383	0.066	J	0.026	J	0.022	J	-	-
Nickel	mg/kg	150	55.1	43.4	13.1		22.7		21.4		20.5	
Selenium	mg/kg	39	2	3.3	1.6	J	0.9	J	0.98	J	-	-
Thallium	mg/kg	NE	1.3	3	-	-	-	-	-	-	**2.7**	
Vanadium	mg/kg	39	40.9	37.6	10.7		21.9		21.1		19.7	
Zinc	mg/kg	2,300	321.75	92.4	78.7		53.2		49.5		59.3	

				LOCATION CODE	ASH PIT 3-SB05			
				SAMPLE NO	AP0045		AP0046	
				SAMPLE DATE	21-Aug-09		21-Aug-09	
				DEPTH	0.3 - 1 Ft		1 - 2 Ft	
				SAMPLE PURPOSE	REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Dinitrotoluene, 2,6-	mg/kg	0.71	NE	0.0776	0.0562	J	-	-
METALS								
Aluminum	mg/kg	7,700	15,500	13000	9,350		6,010	
Antimony	mg/kg	3.1	9.3	1.3	-	-	0.67	J
Arsenic	mg/kg	0.39	36.5	60.8	13.7		20.3	
Barium	mg/kg	1,500	826	451	82.2		63.7	
Beryllium	mg/kg	16	1	16.5	**1.5**		0.47	
Cadmium	mg/kg	7	NE	7.66	-	-	0.21	J
Chromium	mg/kg	0.29	29	19.5	13.6		9.6	
Cobalt	mg/kg	2.3	116	62.2	7.4		5.8	
Copper	mg/kg	310	56.2	124	19.3		17.5	
Iron	mg/kg	5,500	234,000	90300	22,800		16,700	
Lead	mg/kg	400	48.6	28.8	12.5	J	9.6	J
Manganese	mg/kg	180	3,506	4470	339		432	
Mercury	mg/kg	2.3	0.09	0.383	-	-	0.03	J
Nickel	mg/kg	150	55.1	43.4	17.2		16.4	
Selenium	mg/kg	39	2	3.3	1.7	J	1.1	J
Vanadium	mg/kg	39	40.9	37.6	23.7		15.5	
Zinc	mg/kg	2,300	321.75	92.4	66.3		41.6	

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.

SCALE

0 80 160 FEET

FIGURE 5-9

DETECTED CONSTITUENTS AT ASH PIT 3 IN SURFACE AND SUBSURFACE SOIL SAMPLES ABOVE RBSCs AND/OR BSCs (AUGUST 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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LEGEND:

(T)	SURFACE WATER/SEDIMENT SAMPLE
·	UTILITY POLE
———	CREEK, DITCH, CONVEYANCE
mg/kg	MILLIGRAM PER KILOGRAM
ug/L	MIROGRAM PER LITER
NE	NOT ESTABLISHED (RBSCs)
-	NOT DETECTED

			LOCATION CODE	AP1-SD03	
			SAMPLE NO	AP1012	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	mg/kg	77,000	9880	4,490	
Arsenic	mg/kg	0.39	15.9	4	
Barium	mg/kg	15,000	110	31.3	
Beryllium	mg/kg	160	1.6	0.3	J
Cadmium	mg/kg	70	0.59	0.23	J
Chromium	mg/kg	0.29	16.9	7.8	
Cobalt	mg/kg	23	9.9	4.4	
Copper	mg/kg	3,100	126	10.5	
Iron	mg/kg	55,000	21700	9,270	
Lead	mg/kg	400	23.7	7	J
Manganese	mg/kg	1,800	1670	165	
Mercury	mg/kg	23	0.14	0.021	J
Nickel	mg/kg	1,500	26.7	12	
Vanadium	mg/kg	390	25.5	12.4	
Zinc	mg/kg	23,000	137	33.3	

			LOCATION CODE	AP1-SW03	
			SAMPLE NO	AP2012	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - 0 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	31.9	J
Barium	ug/L	7,300	80	31.9	J
Iron	ug/L	26,000	15,100	26.6	J
Lead	ug/L	15	15	2	J
Manganese	ug/L	880	836	247	
Zinc	ug/L	11,000	93.2	10.8	J

			LOCATION CODE	AP1-SW04	
			SAMPLE NO	AP2013	
			SAMPLE DATE	20-May-09	
			DEPTH	0 - 0 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	8,770	
Arsenic	ug/L	0.045	8.3	8.3	J
Barium	ug/L	7,300	80	80	J
Chromium	ug/L	0.043	13.9	13.9	
Cobalt	ug/L	11	6.9	6.9	J
Copper	ug/L	1,500	19.2	19.2	J
Iron	ug/L	26,000	15,100	15,100	
Lead	ug/L	15	15	15	
Manganese	ug/L	880	836	836	
Nickel	ug/L	730	26.2	26.2	J
Vanadium	ug/L	180	20	20	J
Zinc	ug/L	11,000	93.2	93.2	

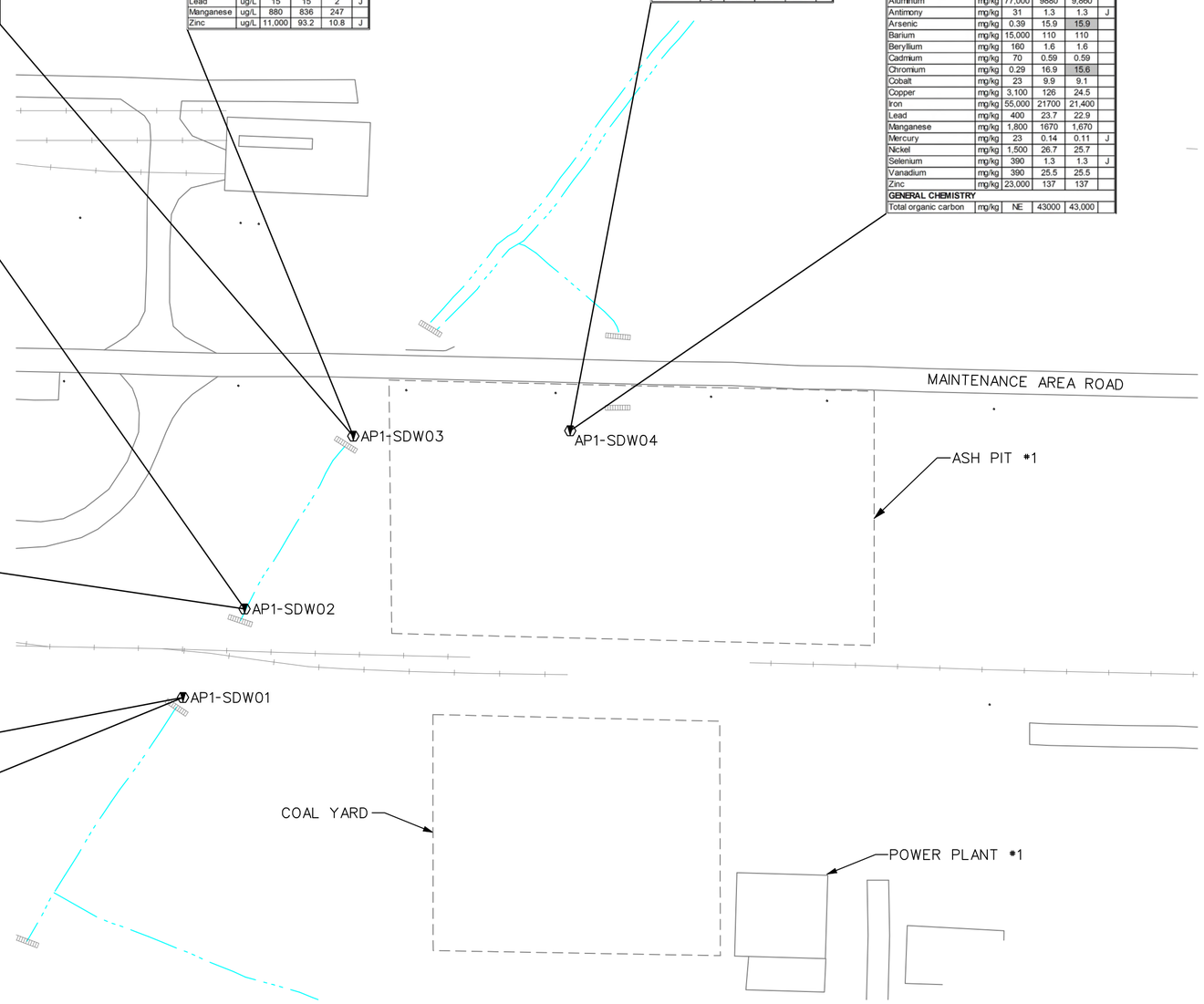
			LOCATION CODE	AP1-SD04	
			SAMPLE NO	AP1013	
			SAMPLE DATE	20-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Benzo(a)anthracene	mg/kg	0.15	0.143	0.121	J
Benzo(a)pyrene	mg/kg	0.015	0.158	0.112	J
Benzo(b)fluoranthene	mg/kg	0.15	0.24	0.175	J
Chrysene	mg/kg	15	0.159	0.149	J
Dibenzofuran	mg/kg	78	0.15	0.15	J
Fluoranthene	mg/kg	2,300	0.253	0.191	J
Methylnaphthalene, 2-	mg/kg	310	0.616	0.616	
Naphthalene	mg/kg	36	0.337	0.337	J
Phenanthrene	mg/kg	NE	0.306	0.306	J
Pyrene	mg/kg	1,700	0.206	0.195	J
PCBs					
Aroclor 1254	mg/kg	0.11	0.0352	0.0352	J
Aroclor 1260	mg/kg	0.22	0.113	0.113	J
METALS					
Aluminum	mg/kg	77,000	9880	9,860	
Antimony	mg/kg	31	1.3	1.3	J
Arsenic	mg/kg	0.39	15.9	15.9	
Barium	mg/kg	15,000	110	110	
Beryllium	mg/kg	160	1.6	1.6	
Cadmium	mg/kg	70	0.59	0.59	
Chromium	mg/kg	0.29	16.9	15.6	
Cobalt	mg/kg	23	9.9	9.1	
Copper	mg/kg	3,100	126	24.5	
Iron	mg/kg	55,000	21700	21,400	
Lead	mg/kg	400	23.7	22.9	
Manganese	mg/kg	1,800	1670	1,670	
Mercury	mg/kg	23	0.14	0.11	J
Nickel	mg/kg	1,500	26.7	25.7	
Selenium	mg/kg	390	1.3	1.3	J
Vanadium	mg/kg	390	25.5	25.5	
Zinc	mg/kg	23,000	137	137	
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	43,000	

			LOCATION CODE	AP1-SW02	
			SAMPLE NO	AP2008	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - 0 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	31.8	J
Barium	ug/L	7,300	80	33.8	J
Manganese	ug/L	880	836	396	
Zinc	ug/L	11,000	93.2	9.6	J

			LOCATION CODE	AP1-SD02	
			SAMPLE NO	AP1008	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Di-n-butyl phthalate	mg/kg	6,100	0.18	0.18	J
METALS					
Aluminum	mg/kg	77,000	9880	7,130	
Antimony	mg/kg	31	1.3	0.7	J
Arsenic	mg/kg	0.39	15.9	9.3	
Barium	mg/kg	15,000	110	35.7	
Beryllium	mg/kg	160	1.6	0.5	
Cadmium	mg/kg	70	0.59	0.32	
Chromium	mg/kg	0.29	16.9	11.8	
Cobalt	mg/kg	23	9.9	8.9	
Copper	mg/kg	3,100	126	17.1	
Iron	mg/kg	55,000	21700	19,300	
Lead	mg/kg	400	23.7	13	
Manganese	mg/kg	1,800	1670	337	
Mercury	mg/kg	23	0.14	0.024	J
Nickel	mg/kg	1,500	26.7	21.3	
Selenium	mg/kg	390	1.3	0.38	J
Vanadium	mg/kg	390	25.5	19.2	
Zinc	mg/kg	23,000	137	45.3	

			LOCATION CODE	AP1-SW01	
			SAMPLE NO	AP2007	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - 0 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
METALS					
Aluminum	ug/L	37,000	8,770	83.8	J
Barium	ug/L	7,300	80	36.6	J
Iron	ug/L	26,000	15,100	31.1	J
Lead	ug/L	15	15	2.1	J
Manganese	ug/L	880	836	488	
Zinc	ug/L	11,000	93.2	13.2	J

			LOCATION CODE	AP1-SD01	
			SAMPLE NO	AP1007	
			SAMPLE DATE	19-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
PCBs					
Aroclor 1254	mg/kg	0.11	0.0352	0.025	J
Aroclor 1260	mg/kg	0.22	0.113	0.0207	J
METALS					
Aluminum	mg/kg	77,000	9880	9,880	
Antimony	mg/kg	31	1.3	0.5	J
Arsenic	mg/kg	0.39	15.9	7.6	
Barium	mg/kg	15,000	110	57.5	
Beryllium	mg/kg	160	1.6	0.62	
Cadmium	mg/kg	70	0.59	0.55	
Chromium	mg/kg	0.29	16.9	16.9	
Cobalt	mg/kg	23	9.9	9.9	
Copper	mg/kg	3,100	126	38.5	
Iron	mg/kg	55,000	21700	21,700	
Lead	mg/kg	400	23.7	23.7	
Manganese	mg/kg	1,800	1670	446	
Mercury	mg/kg	23	0.14	0.14	
Nickel	mg/kg	1,500	26.7	26.7	
Selenium	mg/kg	390	1.3	0.32	J
Silver	mg/kg	390	0.099	0.099	J
Vanadium	mg/kg	390	25.5	21.9	
Zinc	mg/kg	23,000	137	98.9	
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	21,000	



NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES ARE BASED ON REGIONAL SCREENING LEVELS DESCRIBED IN THE TEXT.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, CHLORIDE, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
5. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.

SCALE
0 80 160 FEET

FIGURE 5-10
DETECTED CONSTITUENTS AT ASH PIT 1 IN SURFACE WATER AND SEDIMENT SAMPLES ABOVE RBSCs (MAY 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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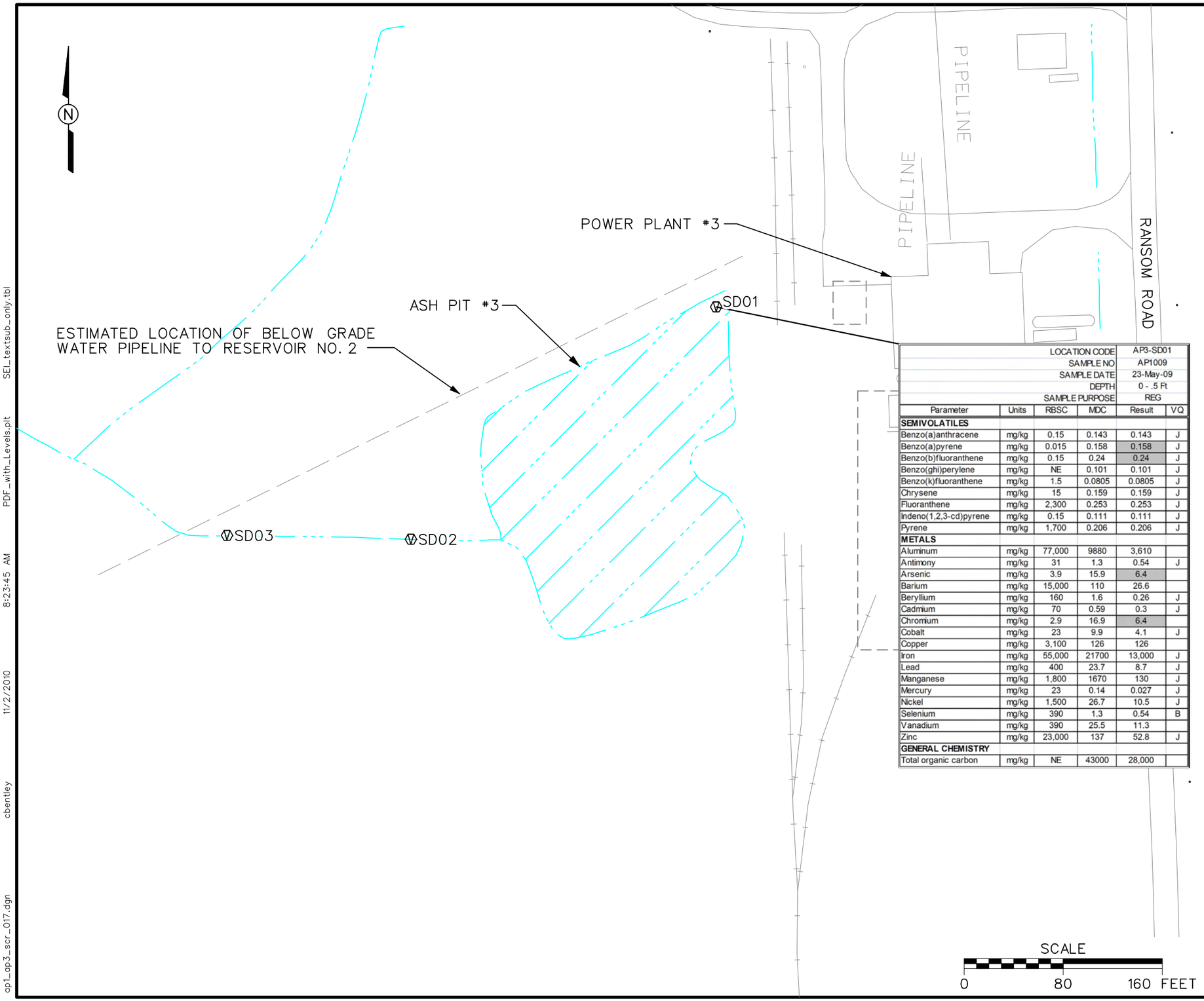

			LOCATION CODE	AP3-SD01	
			SAMPLE NO	AP1009	
			SAMPLE DATE	23-May-09	
			DEPTH	0 - .5 Ft	
			SAMPLE PURPOSE	REG	
Parameter	Units	RBSC	MDC	Result	VQ
SEMIVOLATILES					
Benzo(a)anthracene	mg/kg	0.15	0.143	0.143	J
Benzo(a)pyrene	mg/kg	0.015	0.158	0.158	J
Benzo(b)fluoranthene	mg/kg	0.15	0.24	0.24	J
Benzo(ghi)perylene	mg/kg	NE	0.101	0.101	J
Benzo(k)fluoranthene	mg/kg	1.5	0.0805	0.0805	J
Chrysene	mg/kg	15	0.159	0.159	J
Fluoranthene	mg/kg	2,300	0.253	0.253	J
Indeno(1,2,3-cd)pyrene	mg/kg	0.15	0.111	0.111	J
Pyrene	mg/kg	1,700	0.206	0.206	J
METALS					
Aluminum	mg/kg	77,000	9880	3,610	
Antimony	mg/kg	31	1.3	0.54	J
Arsenic	mg/kg	3.9	15.9	6.4	
Barium	mg/kg	15,000	110	26.6	
Beryllium	mg/kg	160	1.6	0.26	J
Cadmium	mg/kg	70	0.59	0.3	J
Chromium	mg/kg	2.9	16.9	6.4	
Cobalt	mg/kg	23	9.9	4.1	J
Copper	mg/kg	3,100	126	126	
Iron	mg/kg	55,000	21700	13,000	J
Lead	mg/kg	400	23.7	8.7	J
Manganese	mg/kg	1,800	1670	130	J
Mercury	mg/kg	23	0.14	0.027	J
Nickel	mg/kg	1,500	26.7	10.5	J
Selenium	mg/kg	390	1.3	0.54	B
Vanadium	mg/kg	390	25.5	11.3	
Zinc	mg/kg	23,000	137	52.8	J
GENERAL CHEMISTRY					
Total organic carbon	mg/kg	NE	43000	28,000	

LEGEND:

- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- mg/kg MILLIGRAM PER KILOGRAM
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES ARE BASED ON REGIONAL SCREENING LEVELS AS DESCRIBED IN THE TEXT.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
5. VALIDATION QUALIFIERS (VQ):
   J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.

FIGURE 5-11
DETECTED CONSTITUENTS AT ASH PIT 3 IN SEDIMENT SAMPLES ABOVE RBSCs (MAY 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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				LOCATION CODE	ASH PIT 1-PZ01	
				SAMPLE NO	AP3000	
				SAMPLE DATE	12-Dec-08	
				DEPTH	19 - 19 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**9,740**	
Barium	µg/L	730	11,800	90.1	90.1	
Chromium	µg/L	0.043	NE	11.2	11.2	
Copper	µg/L	150	19.8	8.93	8.93	J
Iron	µg/L	2,600	1,550	7,030	**7,030**	
Manganese	µg/L	88	636	3,370	71.4	
Nickel	µg/L	73	8.6	4.51	4.07	J
Vanadium	µg/L	18	NE	19.4	19.4	
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	37.1	
Manganese	µg/L	88	636	3,540	10.7	
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	133,000	
Hardness	µg/L	NE	NE	614,000	451,000	
Hardness	µg/L	NE	NE	671,000	464,000	
Nitrate-Nitrite	µg/L	NE	NE	353	97	
Sulfate	µg/L	NE	NE	61,700	61,700	
Total dissolved solids	µg/L	NE	NE	1,000,000	484,000	
Total suspended solids	µg/L	NE	NE	343,000	161,000	
Turbidity	NTU	NE	NE	195	111	

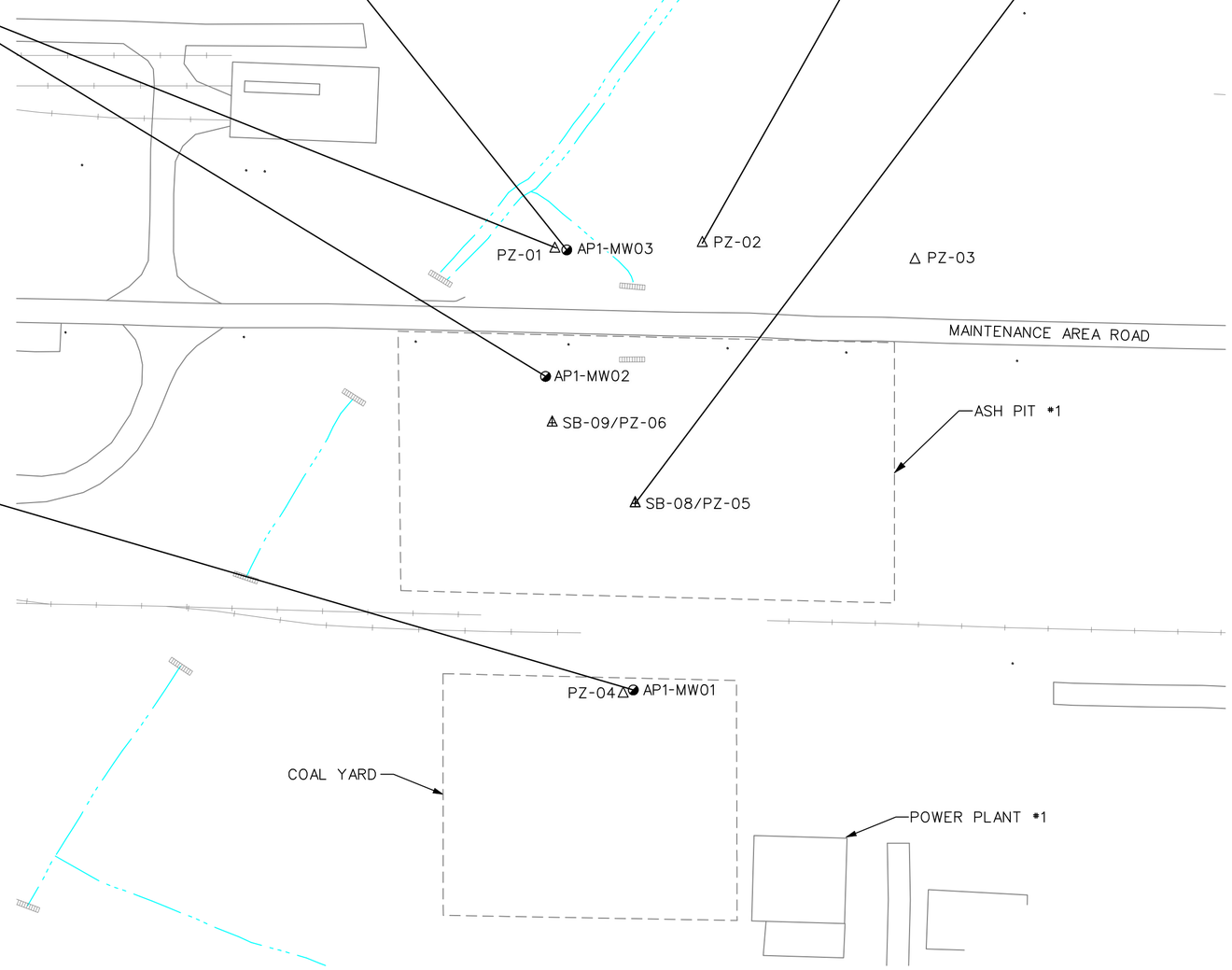
				LOCATION CODE	AP1-MW03			
				SAMPLE NO	AP3052		AP3072	
				SAMPLE DATE	11-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	**1,110**	J	17.2	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	6.3	J
Barium	µg/L	730	11,800	252	252		154	J
Cobalt	µg/L	1.1	12.1	22.2	1	J	2.7	J
Iron	µg/L	2,600	1,550	4,610	1,090		-	-
Lead	µg/L	15	NE	4.3	2.2	J	2.4	B
Manganese	µg/L	88	636	32,300	136		463	
Nickel	µg/L	73	8.6	15.2	7.4	J	4.7	J
Selenium	µg/L	18	NE	5.2	4.7	J	5.2	J
Vanadium	µg/L	18	NE	2.9	2.9	J	-	-
Zinc	µg/L	1,100	507	23.2	14.3	J	7.7	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	3,320	19.1	J	**3,320**	
Arsenic	µg/L	0.045	7.4	6.2	-	-	5.7	J
Barium	µg/L	730	11,800	255	255		177	J
Chromium	µg/L	0.043	NE	5.5	-	-	5.5	J
Cobalt	µg/L	1.1	12.1	22.5	-	-	5.1	J
Copper	µg/L	150	19.8	10.5	-	-	10.5	J
Iron	µg/L	2,600	1,550	6,070	-	-	**6,070**	
Lead	µg/L	15	NE	5.8	-	-	4.9	J
Manganese	µg/L	88	636	32,100	102		550	
Nickel	µg/L	73	8.6	14.8	6.6	J	**13.4**	J
Selenium	µg/L	18	NE	6.9	5.3	J	-	-
Vanadium	µg/L	18	NE	5.9	0.9	J	5.9	J
Zinc	µg/L	1,100	507	23.4	11.4	J	23.4	
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	349,000		391,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	394,000		395,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	55	J
Sulfate	µg/L	NE	NE	589,000	127,000		109,000	
Total dissolved solids	µg/L	NE	NE	1,890,000	660,000		619,000	
Total suspended solids	µg/L	NE	NE	300,000	78,000		300,000	
Turbidity	NTU	NE	NE	47	18.7		27.8	

				LOCATION CODE	ASH PIT 1-PZ02	
				SAMPLE NO	AP3001	
				SAMPLE DATE	11-Dec-08	
				DEPTH	16 - 16 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**3,790**	
Barium	µg/L	730	11,800	90.1	72.9	
Cobalt	µg/L	1.1	12.1	2.91	2.91	J
Copper	µg/L	150	19.8	8.93	8.6	J
Iron	µg/L	2,600	1,550	7,030	**3,400**	
Lead	µg/L	15	NE	3.2	3.2	J
Manganese	µg/L	88	636	3,370	306	
Nickel	µg/L	73	8.6	4.51	4.51	J
Vanadium	µg/L	18	NE	19.4	8.07	
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	30.5	
Lead	µg/L	15	NE	10.4	10.4	
Manganese	µg/L	88	636	3,540	35.2	
Thallium	µg/L	NE	NE	5.08	5.08	J
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	172,000	
Hardness	µg/L	NE	NE	614,000	431,000	
Hardness	µg/L	NE	NE	671,000	363,000	
Nitrate-Nitrite	µg/L	NE	NE	353	353	
Sulfate	µg/L	NE	NE	61,700	39,400	
Total dissolved solids	µg/L	NE	NE	1,000,000	384,000	
Total suspended solids	µg/L	NE	NE	343,000	343,000	
Turbidity	NTU	NE	NE	195	195	

				LOCATION CODE	ASH PIT 1-PZ05	
				SAMPLE NO	AP3004	
				SAMPLE DATE	15-Dec-08	
				DEPTH	20 - 20 Ft	
				SAMPLE PURPOSE	REG	
				LOW-FLOW SAMPLED	No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ
EXPLOSIVES						
Amino-2,6-dinitrotoluene, 4	µg/L	7.3	NE	0.342	0.342	J
METALS-UNFILTERED						
Aluminum	µg/L	3,700	309	9,740	**2,080**	
Barium	µg/L	730	11,800	90.1	41.5	B
Iron	µg/L	2,600	1,550	7,030	**2,580**	
Manganese	µg/L	88	636	3,370	**3,370**	
Vanadium	µg/L	18	NE	19.4	4.24	J
METALS-FILTERED						
Barium	µg/L	730	11,800	37.1	32.2	B
Iron	µg/L	2,600	1,550	--	94.7	B
Manganese	µg/L	88	636	3,540	**3,540**	
WATER QUALITY PARAMETERS						
Alkalinity	µg/L	NE	NE	246,000	246,000	
Hardness	µg/L	NE	NE	614,000	614,000	
Hardness	µg/L	NE	NE	671,000	671,000	
Nitrate-Nitrite	µg/L	NE	NE	353	35	J
Total dissolved solids	µg/L	NE	NE	1,000,000	1,000,000	
Total suspended solids	µg/L	NE	NE	343,000	66,000	
Turbidity	NTU	NE	NE	195	101	

				LOCATION CODE	AP1-MW02			
				SAMPLE NO	AP3051		AP3071	
				SAMPLE DATE	10-May-09		6-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	76.8	J	68.7	J
Barium	µg/L	730	11,800	252	61	J	53.1	J
Cobalt	µg/L	1.1	12.1	22.2	3	J	3.6	J
Lead	µg/L	15	NE	4.3	-	-	2	B
Manganese	µg/L	88	636	32,300	351		436	
Nickel	µg/L	73	8.6	15.2	**15.2**	J	5.8	J
Selenium	µg/L	18	NE	5.2	4.9	J	3.7	J
Vanadium	µg/L	18	NE	2.9	1.2	J	-	-
Zinc	µg/L	1,100	507	23.2	13.4	J	-	-
METALS-FILTERED								
Aluminum	µg/L	3,700	309	3,320	15.5	J	12.8	J
Barium	µg/L	730	11,800	255	61.7	J	51.6	J
Cobalt	µg/L	1.1	12.1	22.5	3.2	J	3.6	J
Lead	µg/L	15	NE	5.8	2	J	2.2	J
Manganese	µg/L	88	636	32,100	355		410	
Nickel	µg/L	73	8.6	14.8	**14.8**	J	6.1	J
Selenium	µg/L	18	NE	6.9	6.9	J	-	-
Vanadium	µg/L	18	NE	5.9	1.1	J	-	-
Zinc	µg/L	1,100	507	23.4	12.1	J	11.4	J
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	253,000		313,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	897,000		730,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	41	J
Sulfate	µg/L	NE	NE	589,000	589,000		358,000	J
Total dissolved solids	µg/L	NE	NE	1,890,000	1,890,000		1,230,000	
Total suspended solids	µg/L	NE	NE	300,000	23,000		6,000	J
Turbidity	NTU	NE	NE	47	5.4	J	3.4	

				LOCATION CODE	AP1-MW01			
				SAMPLE NO	AP3050		AP3070	
				SAMPLE DATE	7-May-09		4-Nov-09	
				DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	Yes		Yes	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
EXPLOSIVES								
Nitrotoluene, 2-	µg/L	0.31	NE	0.18	-	-	0.18	J
Nitrotoluene, 4-	µg/L	4.2	NE	0.17	-	-	0.17	J
VOLATILES								
Chloroform	µg/L	0.19	NE	0.48	0.48	J	-	-
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	1,110	26.1	J	191	J
Arsenic	µg/L	0.045	7.4	6.3	-	-	5.4	J
Barium	µg/L	730	11,800	252	28.6	J	37.8	J
Cobalt	µg/L	1.1	12.1	22.2	**22.2**	J	6.8	J
Iron	µg/L	2,600	1,550	4,610	**4,610**		**4,410**	
Lead	µg/L	15	NE	4.3	4.3	J	2.6	B
Manganese	µg/L	88	636	32,300	**32,300**		**8,290**	
Nickel	µg/L	73	8.6	15.2	**13.3**	J	4.1	
Thallium	µg/L	NE	NE	34.6	34.6		-	-
Zinc	µg/L	1,100	507	23.2	23.2		8.6	B
METALS-FILTERED								
Arsenic	µg/L	0.045	7.4	6.2	-	-	6.2	J
Barium	µg/L	730	11,800	255	28.4	J	34.9	J
Cobalt	µg/L	1.1	12.1	22.5	**22.5**	J	5.1	J
Iron	µg/L	2,600	1,550	6,070	**4,590**		**4,990**	
Lead	µg/L	15	NE	5.8	5.8		-	-
Manganese	µg/L	88	636	32,100	**32,100**		**6,270**	
Nickel	µg/L	73	8.6	14.8	**12.8**	J	3.9	J
Thallium	µg/L	NE	NE	37.8	37.8		-	-
Zinc	µg/L	1,100	507	23.4	23.2		9.2	J
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	448,000	448,000		395,000	
HARDNESS (as CaCO3)	µg/L	NE	NE	1,020,000	1,020,000		745,000	
Nitrate-Nitrite	µg/L	NE	NE	130	-	-	130	J
Sulfate	µg/L	NE	NE	589,000	585,000		311,000	J
Total dissolved solids	µg/L	NE	NE	1,890,000	1,520,000		1,080,000	
Total suspended solids	µg/L	NE	NE	300,000	-	-	25,000	
Turbidity	NTU	NE	NE	47	8.6		47	



LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- ug/L MICROGRAM PER LITER
- NE NOT ESTABLISHED (RBSCs)
- \- NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. NO NITROAROMATICS AND/OR SVOCs WERE DETECTED IN PIEZOMETER PZ04 SO NO DATA IS SHOWN.
8. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - B- THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.

SCALE
0 80 160 FEET

FIGURE 5-12
DETECTED CONSTITUENTS AT ASH PIT 1 IN OVERBURDEN/SHALE GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (DECEMBER 2008, MAY, AND NOVEMBER 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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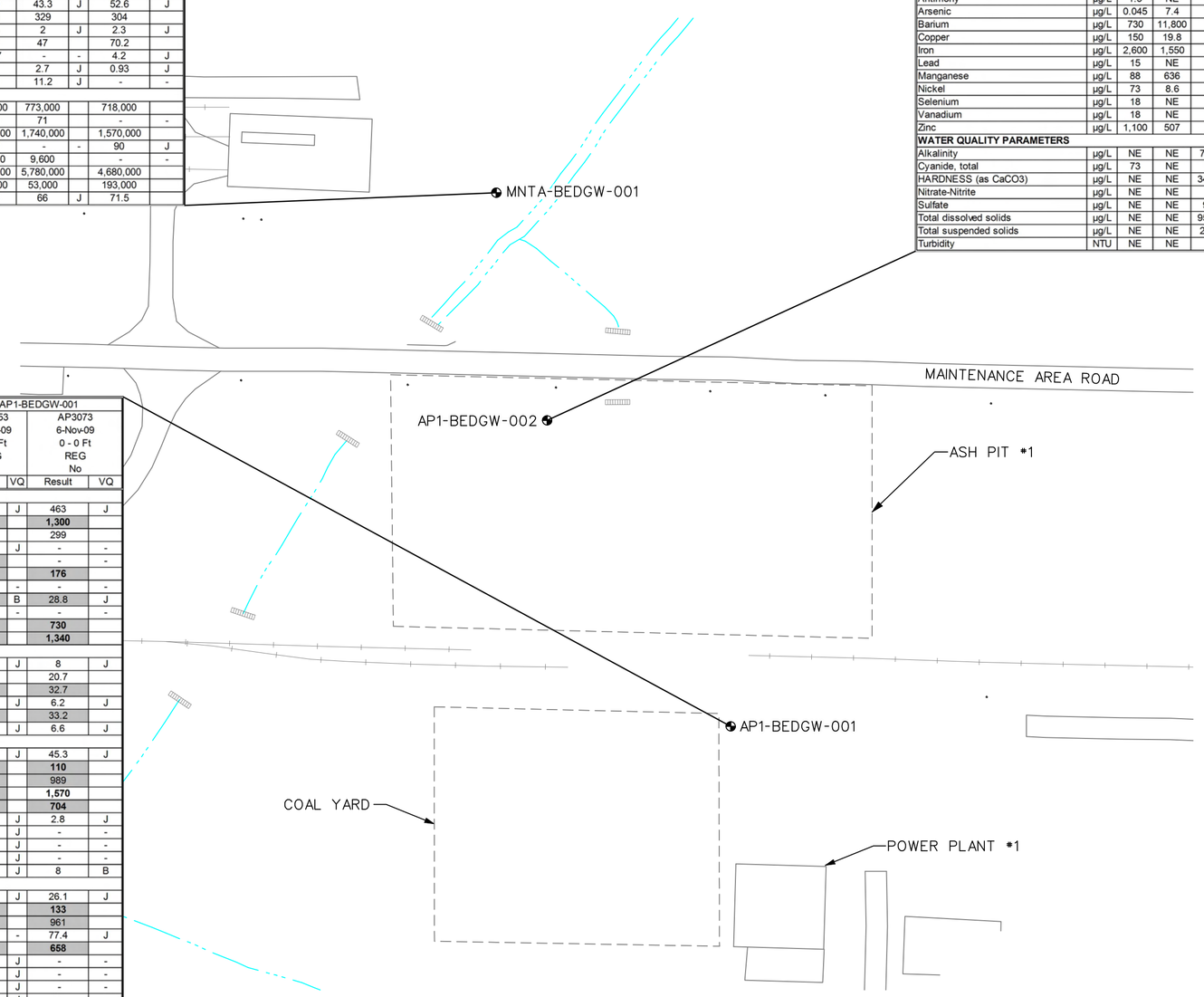
				LOCATION CODE	IT-MNTA-BEDGW-001			
				SAMPLE NO	LB3074		BEDGW-001-1109	
				DATE	19-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	345	J	-	-
Benzene	µg/L	0.41	2.4	1300	-	-	**3.7**	
Butanone, 2-	µg/L	710	NE	299	81.3	J	-	-
Carbon disulfide	µg/L	100	NE	12.3	11.6	J	3.8	
Chloroform	µg/L	0.19	NE	66.7	66.7		-	-
Ethylbenzene	µg/L	1.5	0.87	176	**16.7**	J	**9.9**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	3.3	J
Methylene chloride	µg/L	4.8	NE	77.6	77.6	J	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	1.2	
Toluene	µg/L	230	1.7	730	**14.2**	J	**10**	
Xylenes, total	µg/L	20	5.5	1340	**235**		**136**	
SEMIVOLATILES								
Fluorene	µg/L	150	NE	5.4	5.4	J	-	-
Methylnaphthalene, 2-	µg/L	15	NE	256	71		256	J
Naphthalene	µg/L	0.14	NE	64.9	17.7	J	64.9	J
Phenanthrene	µg/L	NE	NE	37.3	12.7	J	37.3	J
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	90.4	B	79.6	J
Barium	µg/L	730	11,800	989	343		305	
Cadmium	µg/L	1.8	NE	1.4	1.4	J	-	-
Iron	µg/L	2,600	1,550	4910	591		180	J
Lead	µg/L	15	NE	2.6	2.6	J	-	-
Manganese	µg/L	88	636	857	95.5		85.8	
Thallium	µg/L	NE	NE	5.3	3.8	J	-	-
Vanadium	µg/L	18	NE	2.8	2.8	J	1.6	J
Zinc	µg/L	1,100	507	16	11.6	J	11.5	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	43.3	J	52.6	J
Barium	µg/L	730	11,800	961	329		304	
Lead	µg/L	15	NE	7.5	2	J	2.3	J
Manganese	µg/L	88	636	804	47		70.2	
Selenium	µg/L	18	NE	16.7	-	-	4.2	J
Vanadium	µg/L	18	NE	3.1	2.7	J	0.93	J
Zinc	µg/L	1,100	507	140	11.2	J	-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	773,000		718,000	
Cyanide, total	µg/L	73	NE	120	71		-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	1,740,000		1,570,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	90	J
Sulfate	µg/L	NE	NE	93400	9,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	5,780,000		4,680,000	
Total suspended solids	µg/L	NE	NE	250000	53,000		193,000	
Turbidity	NTU	NE	NE	296	66	J	71.5	

				LOCATION CODE	AP1-BEDGW-002			
				SAMPLE NO	AP3054		AP3074	
				DATE	10-May-09		10-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	-	-	92.9	B
Benzene	µg/L	0.41	2.4	1300	**67.1**		**27.5**	
Butanone, 2-	µg/L	710	NE	299	10.9		-	-
Carbon disulfide	µg/L	100	NE	12.3	3	J	1.9	J
Chloroform	µg/L	0.19	NE	66.7	-	-	12	
Chloromethane	µg/L	19	NE	216	-	-	216	
Ethylbenzene	µg/L	1.5	0.87	176	**45.6**		**30.9**	
Methylene chloride	µg/L	4.8	NE	77.6	3	B	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	0.53	J	-	-
Toluene	µg/L	230	1.7	730	**69.2**		**43.6**	
Xylenes, total	µg/L	20	5.5	1340	**473**		**370**	
SEMIVOLATILES								
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	-	-	0.97	J
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	2	J	2.8	J
Methylnaphthalene, 2-	µg/L	15	NE	256	14.5		14.5	
Naphthalene	µg/L	0.14	NE	64.9	11.8		15.3	
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	67.5	J	46.7	J
Antimony	µg/L	1.5	NE	5.8	5.8	J	-	-
Arsenic	µg/L	0.045	7.4	110	**101**		**50.7**	
Barium	µg/L	730	11,800	989	555		434	
Iron	µg/L	2,600	1,550	4910	322		335	J
Manganese	µg/L	88	636	857	548		38	
Selenium	µg/L	18	NE	11.9	6.3	J	5.2	J
Vanadium	µg/L	18	NE	2.8	2.6	J	1.3	J
Zinc	µg/L	1,100	507	16	16	J	7.7	J
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	**409**		24.8	J
Antimony	µg/L	1.5	NE	5.4	5.4	J	-	-
Arsenic	µg/L	0.045	7.4	133	**77.7**		**36.7**	
Barium	µg/L	730	11,800	961	307		406	
Copper	µg/L	150	19.8	43.1	**43.1**		-	-
Iron	µg/L	2,600	1,550	124	124	J	-	-
Lead	µg/L	15	NE	7.5	7.5	J	-	-
Manganese	µg/L	88	636	804	379		10.5	J
Nickel	µg/L	73	8.6	55.2	**55.2**		-	-
Selenium	µg/L	18	NE	16.7	15	J	4	J
Vanadium	µg/L	18	NE	3.1	3.1	J	-	-
Zinc	µg/L	1,100	507	140	140		-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	678,000		728,000	
Cyanide, total	µg/L	73	NE	120	120	J	-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	1,250,000			
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	190	J
Sulfate	µg/L	NE	NE	93400	93,400		-	-
Total dissolved solids	µg/L	NE	NE	9580000	3,130,000		3,520,000	
Total suspended solids	µg/L	NE	NE	250000	88,000		130,000	
Turbidity	NTU	NE	NE	296	6.3	J	180	J

				LOCATION CODE	AP1-BEDGW-001			
				SAMPLE NO	AP3053		AP3073	
				DATE	9-May-09		6-Nov-09	
				SAMPLE DEPTH	0 - 0 Ft		0 - 0 Ft	
				SAMPLE PURPOSE	REG		REG	
				LOW-FLOW SAMPLED	No		No	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ
VOLATILES								
Acetone	µg/L	2,200	NE	463	140	J	463	J
Benzene	µg/L	0.41	2.4	1300	**613**		**1,300**	
Butanone, 2-	µg/L	710	NE	299	71.5		299	
Carbon disulfide	µg/L	100	NE	12.3	12.3	J	-	-
Chloroform	µg/L	0.19	NE	66.7	18		-	-
Ethylbenzene	µg/L	1.5	0.87	176	**126**		**176**	
Methyl-2-pentanone, 4-	µg/L	200	NE	3.3	-	-	-	-
Methylene chloride	µg/L	4.8	NE	77.6	11.2	B	28.8	J
Tetrachloroethane, 1,1,2,2-	µg/L	0.067	NE	1.2	-	-	-	-
Toluene	µg/L	230	1.7	730	**490**		**730**	
Xylenes, total	µg/L	20	5.5	1340	**1,060**		**1,340**	
SEMIVOLATILES								
3-Methylphenol and 4-Methylphenol	µg/L	NE	NE	9	9	J	8	J
Dimethylphenol, 2,4-	µg/L	73	NE	24.7	24.7		20.7	
Methylnaphthalene, 2-	µg/L	15	NE	256	36.2		32.7	
Methylphenol, 2-	µg/L	180	NE	6.9	6.9	J	6.2	J
Naphthalene	µg/L	0.14	NE	64.9	33		33.2	
Phenol	µg/L	1,100	NE	6.6	6.6	J	6.6	J
METALS-UNFILTERED								
Aluminum	µg/L	3,700	309	90.4	57.2	J	45.3	J
Arsenic	µg/L	0.045	7.4	110	**69.7**		**110**	
Barium	µg/L	730	11,800	989	897		989	
Iron	µg/L	2,600	1,550	4910	**4,910**		**1,570**	
Manganese	µg/L	88	636	857	**857**		**704**	
Nickel	µg/L	73	8.6	5.8	5.8	J	2.8	J
Selenium	µg/L	18	NE	11.9	11.9	J	-	-
Thallium	µg/L	NE	NE	5.3	5.3	J	-	-
Vanadium	µg/L	18	NE	2.8	2.2	J	-	-
Zinc	µg/L	1,100	507	16	11.5	J	8	B
METALS-FILTERED								
Aluminum	µg/L	3,700	309	409	23.2	J	26.1	J
Arsenic	µg/L	0.045	7.4	133	**65.6**		**133**	
Barium	µg/L	730	11,800	961	813		961	
Iron	µg/L	2,600	1,550	124	-	-	77.4	J
Manganese	µg/L	88	636	804	**804**		**658**	
Nickel	µg/L	73	8.6	55.2	3.8	J	-	-
Selenium	µg/L	18	NE	16.7	16.7	J	-	-
Vanadium	µg/L	18	NE	3.1	2	J	-	-
Zinc	µg/L	1,100	507	140	8.3	J	-	-
WATER QUALITY PARAMETERS								
Alkalinity	µg/L	NE	NE	773000	386,000		453,000	
Cyanide, total	µg/L	73	NE	120	37	J	-	-
HARDNESS (as CaCO3)	µg/L	NE	NE	3450000	3,150,000		3,450,000	
Nitrate-Nitrite	µg/L	NE	NE	190	-	-	46	J
Sulfate	µg/L	NE	NE	93400	13,600		-	-
Total dissolved solids	µg/L	NE	NE	9580000	9,580,000		7,680,000	
Total suspended solids	µg/L	NE	NE	250000	250,000		26,000	
Turbidity	NTU	NE	NE	296	35.1	J	296	



LEGEND:

- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- ug/L — MICROGRAM PER LITER
- NE — NOT ESTABLISHED (RBSCs)
- \- — NOT DETECTED

NOTES:

1. SHADED CELL INDICATES VALUE IS GREATER THAN THE RISK-BASED SCREENING CONCENTRATION (RBSC).
2. RBSC VALUES REFLECT AN INCREMENTAL LIFETIME CANCER RISK (ILCR) OF 1E-6 OR A NONCANCER HAZARD QUOTIENT (HQ) OF 0.1. FOR CHEMICALS THAT EXHIBIT BOTH CANCER AND NONCANCER EFFECTS, WHICHEVER TYPE OF EFFECT RESULTS IN A LOWER CONCENTRATION (USING AN ILCR OF 1E-6 AND AN HQ OF 0.1), THAT CONCENTRATION IS SELECTED AS THE RBSC.
3. MDC IS MAXIMUM DETECTED CONCENTRATION FOR THE INVESTIGATION AREA ("B" QUALIFIED DATA NOT INCLUDED).
4. BSC IS BACKGROUND SCREENING CONCENTRATION.
5. BOLD TEXT INDICATES VALUE IS GREATER THAN THE BSC.
6. ANALYTICAL RESULTS FOR NUTRITIONALLY ESSENTIONAL ELEMENTS CALCIUM, MAGNESIUM, POTASSIUM AND SODIUM ARE NOT INCLUDED.
7. NO NITROAROMATICS AND/OR SVOCs WERE DETECTED IN PIEZOMETER PZ04 SO NO DATA IS SHOWN.
8. VALIDATION QUALIFIERS (VQ):
   - J- THE COMPOUND/ANALYTE WAS POSITIVELY IDENTIFIED; THE REPORTED VALUE IS AN ESTIMATED CONCENTRATION.
   - B- THE ANALYTE WAS NOT DETECTED SIGNIFICANTLY ABOVE THE LEVELS FOUND IN THE ASSOCIATED METHOD BLANK OR FIELD BLANKS.

SCALE
0 80 160 FEET

FIGURE 5-13
DETECTED CONSTITUENTS AT ASH PIT 1 IN BEDROCK GROUNDWATER SAMPLES ABOVE RBSCs AND/OR BSCs (MAY AND NOVEMBER 2009)

ASH PIT 1 AND ASH PIT 3 SCR
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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APPENDIX A

DIRECT-PUSH SOIL BORING/PIEZOMETER, MONITORING WELL HTRW DRILL LOGS AND WELL CONSTRUCTION DIAGRAMS, AND SOIL BORING HTRW DRILL LOGS

AP 1

HTRW DRILLING LOG

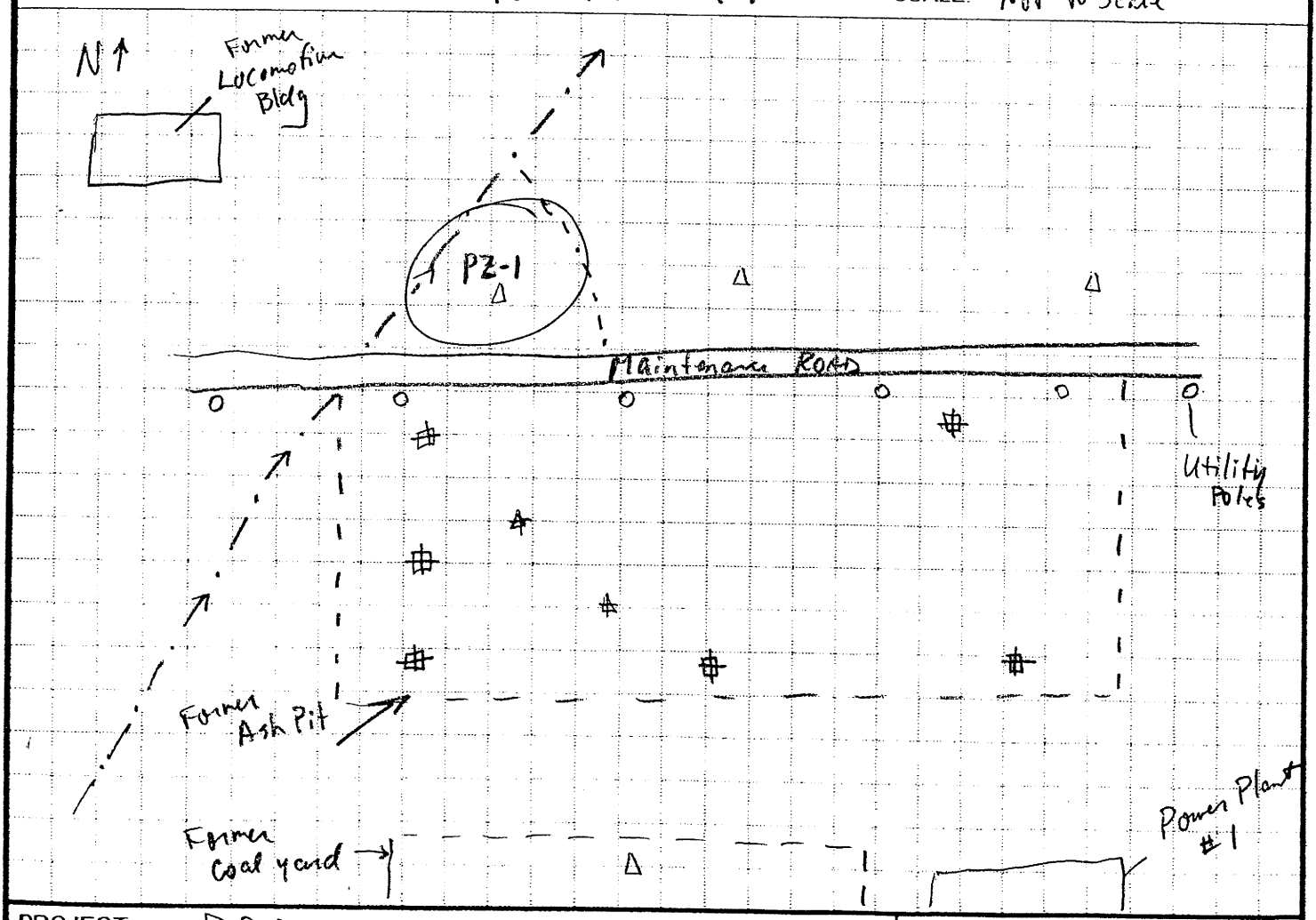
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: PZ-01
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 3 SHEETS
5. NAME OF DRILLER: Jimmy Griffith	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 636.8	Northing: 623724.22 Easting: 1918737.52
	10. DATE STARTED: 12-8-03	11. DATE COMPLETED: 12-8-03
12. OVERBURDEN THICKNESS: 19.3'	15. DEPTH GROUNDWATER ENCOUNTERED: 10.0'	
13. DEPTH DRILLED INTO ROCK: 0	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE: 19.3'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	—	—	—	—	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	NA	1" Piezo	Eric N. Weaver

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	PZ-01

AP-1 PZ01

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-01

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Fill (Loose 2.5Y/1) black vfg SAND, organics (roots) trace cinders. 0.6	SM	0.0	NA	NA	3.6'/5'	1035 S-1 (0-5')
	1	Native soil (loose ~~2.5Y/4~~) 10YR 5/3 brown mottled br. gray silty clay 2.0	CL					
	2	SILT (~~loose~~ soft) 7.5YR 2.5/2 vdb homogeneous dry mottled yellowish brown	ml					
	3							
	4			0.0				
	5	5.0						
	5	CLAY (~~loose~~ stiff) 10YR 6/8 dry mottled yellowish brown ~~White 2.5Y to 5YR Range~~	CH				5/5	S-2 1040 (5-10')
	6							
	7							
	8							
	9			0.0				
	10							

Project: PBOW | Hole Number: PZ-01

API

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ01

Project: PBOW | Geologist: E. Weaver | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10				NA	NA		Water @ 10' ▽ S-3 1045
	11		ch				5/5	
	12	12.0 CLAY 10YR 4/1 dg very stiff homogeneous with ≈ 5% shale frags coarse grained pebble size	ch	0.0				
	13							
	14							
	15						5/5	S-4 1050 (15-19.3')
	16							
	17							
	18							
	19	Refusal at 19.3' Total depth 19.3'						
	20							

Project: PBOW | Hole Number: PZ-01

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Temporary Piezometer

AP 1

Project:	PBOW	Piezometer Number:	PZ-01
Location:	Sandusky, Ohio	Site Location:	Ash Pit 1
Client:	USACE, Nashville, TN	Installation Date	12-8-08
Subcontractor:	Tri-State Drilling	Northing:	623724.22
Driller:	Jimmy Griffin	Easting:	1918737.52
Shaw Field Representative:	Eric Weaver	Shaw Project Number:	132288

Top of Casing Elevation (ft): 637.65

Top of Casing Stickup (ft): 0.9'

Land Surface Elevation (ft): 636.8

Approximate Diameter of Borehole (in): 3-5"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 10'

Date: 12-8-08

Post Development: NA TOC

Date:

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 9.1'

Bottom of Screen Interval (ft): 19.1

Bottom of Piezometer (ft): 19.24

Bottom of Borehole (ft): 19.3'

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14

Backfill Material: NA

Abandonment:

Date: 6/18/09

Procedure: Natural fill Grouted (Bentonite) Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).
If completed as well - see well construction diagram.

AP 1

HTRW DRILLING LOG

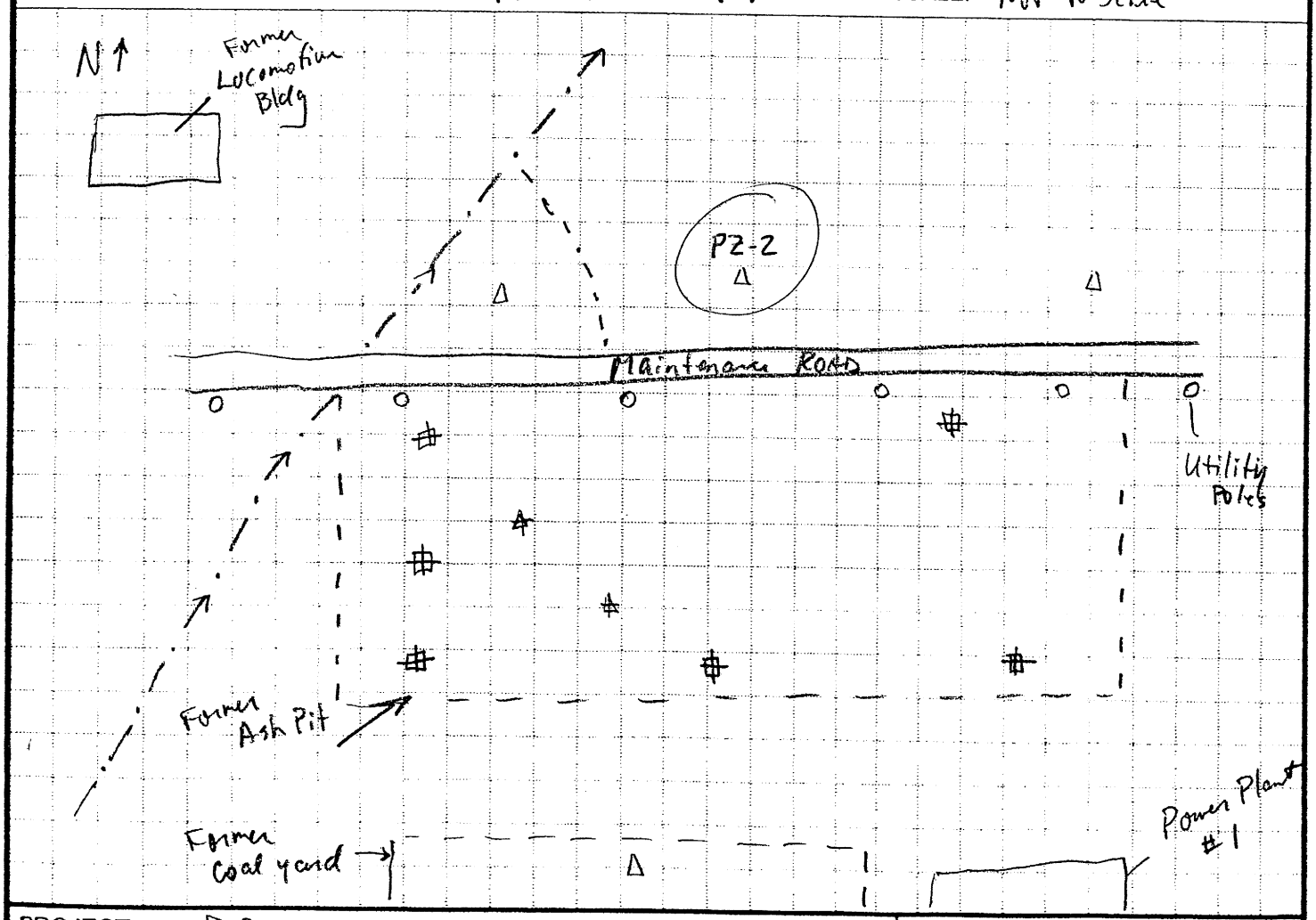
DISTRICT	Nashville, TN
HOLE NUMBER	PZ-2
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 3
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	637.7 Northing: 633728.76 Easting: 1918855.35
10. DATE STARTED	12-8-08
11. DATE COMPLETED	12-8-08
12. OVERBURDEN THICKNESS	18.4'
15. DEPTH GROUNDWATER ENCOUNTERED	10.4'
13. DEPTH DRILLED INTO ROCK	0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	18.4'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	—	—	—	—	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	NA	1" Piezo	[illegible]

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not to Scale



PROJECT	PBOW
HOLE NO.	PZ-2

Ash Pit 1

API

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-2

Project: PBOW | Geologist: E. Weaver | Sheet 2 of Sheets 3

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	0'	Fill (medium dense (2.5y 2.5/1) Black, very fine grained SAND, organics (roots), dry)	SM	0.0	NA	NA	3.7'/5'	S-1 @0945 (0-5')
	1	1.0' Fill (loose (10yR 4/4) dark yellow brown, mottled (strong brown, gray, black) organics ≈ 15% silt) 1.6'						
	2	2' Native Soil, loose (2.5y 2.5/1) black, very fine grained SAND organics (roots) dry. 2.6'	SM					
	3	SAND, thin laminations (7.5yR 4/6) strong brown						
	4	SAND, loose (7.5YR 2.5/2) very dark brown, very fine grained homogeneous, dry.		0.0				
	5	5.0' CLAY, mottled 40% dark brown, black, gray (10YR 4/1) dark gray, very stiff.	CH				5'/5'	S-2 @0950 (5-10')
	6	- mottling decreasing with depth.						
	7							
	8							
	9			0.0				
	0							

Project PBOW | Hole Number: PZ-2

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API

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-2

Project: PBOW | Geologist: E. Weaver | Sheet 3 of Sheets 3

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10				NA	NA	5'/5'	S-3 /955 ▽ Groundwater encountered 10A'
	11							
	12		Ch					
	13	13.0		NM				
	14	CLAY, homogeneous, high plastic clay, rounded coarse grained pebble size shale fragments	Ch					
	15							
	16			NM			~~5'~~ 3.4' EW 3.4'/3.4'	~~S-2 DEW/950 DEW~~ S-4 1000
	17							
	18							
	19	Refusal @ 18.4' Total Depth 18.4'						
	20							

Project PBOW | Hole Number: PZ-2

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AP-1
PZ2

Temporary Piezometer

AP 1

Project:	PBOW	Piezometer Number:	PZ-2
Location:	Sandusky, Ohio	Site Location:	Ash Pit 1
Client:	USACE, Nashville, TN	Installation Date	12-8-08
Subcontractor:	Tri-State Drilling	Northing:	623728.76
Driller:	Jimmy Griffith	Easting:	1918855.35
Shaw Field Representative:	Eric Weaver	Shaw Project Number:	132288

Top of Casing Elevation (ft): 639.11

Top of Casing Stickup (ft): 1.0

Land Surface Elevation (ft): 637.7

Approximate Diameter of Borehole (in): 3.5"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 10.4

Date: 12-8-08

Post Development: TOC

Date:

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 8.0

Bottom of Screen Interval (ft): 18.0'

Bottom of Piezometer (ft): 18.14'

Bottom of Borehole (ft): 18.4'

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14

Backfill Material: NA

Abandonment:

Date: 6/18/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).
If completed as well - see well construction diagram.

AP-1 PZ03

HTRW DRILLING LOG

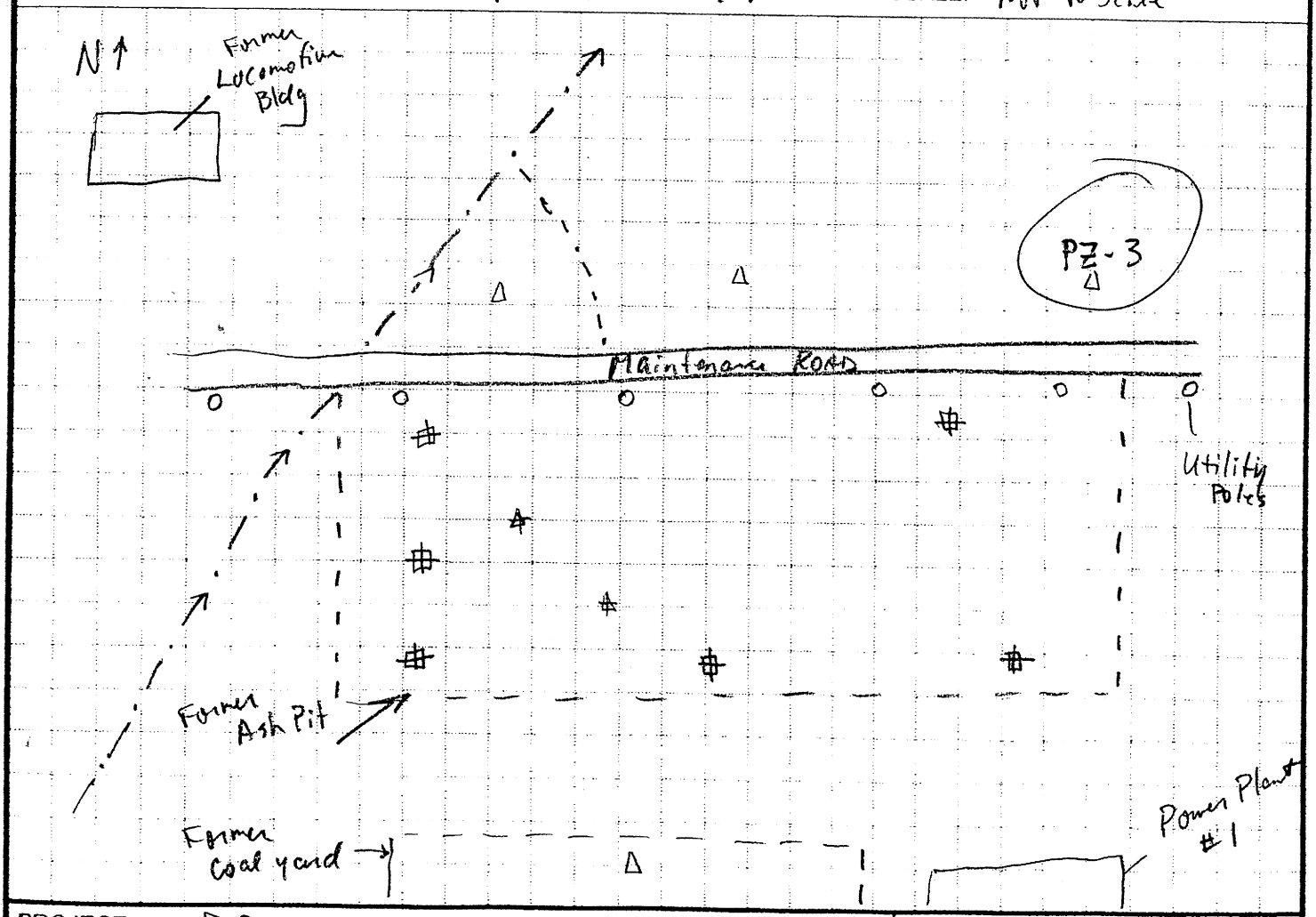
DISTRICT: Nashville, TN		HOLE NUMBER: PZ-03
1. COMPANY NAME: Shaw E+I	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 3 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 638.7	Northing: 623715.50 Easting: 1919025.14
	10. DATE STARTED: 12-8-08	11. DATE COMPLETED: 12-8-08
12. OVERBURDEN THICKNESS: 18 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: unknown	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:	
14. TOTAL DEPTH OF HOLE: 18 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	—	—	—	—	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	NA	1" Piezo	Eric D. Weaver

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	PZ-03

AP-1

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-03

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Fill (loose, (2.5Y/1) Black, vfg SAND, organics (roots) dry) 0.9	SM	0.0	NA	NA	4.2'/5'	Begin drilling 12/8/08 0855
	1	1.2						S-1 0'-5'
		Fill (loose, (10YR 4-4 dy bl, little silt,) 1.1						
	2	Native Soil (loose (2.5Y/1) black, vfg SAND, organics (roots) dry) 2.3	SM					
	3	SAND thin laminations 7.5YR 4/6 sb		0.0				
	4	SAND (loose, 7.5YR 2.5/2 vdb) vfg homogeneous, dry) ~3.6' (color changes to 10YR 6/8) dry.						
	5	5.1						
		CLAY 10YR 4/1 dg very stiff, homogeneous little (~5%) chalk frags (coarse grain to pebble size) dry	CH				5'/5'	0902 S-2 5'-10'
	6							
	7							
	8							
	9			0.0				
	10							

Project: PBOW | Hole Number: PZ-03

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AP-1

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-03

Project: PBOW | Geologist: E. Weaver | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10				NA	NA	5'/5'	S-3 0910 10'-15'
	11	Increasing fragments with depth	ch	NM				
	12							
	13							
	14							
	15						3'/3'	S-4 0915
	16							
	17							
	18	Refusal @ 18' Total depth = 18'						
	19							
	20							

Project: PBOW | Hole Number: PZ-3

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	AP1/PZ03
Location:	Sandusky, Ohio	Site Location:	Ash Pit 1
Client:	USACE, Nashville, TN	Installation Date	12-8-08
Subcontractor:	Tri-State Drilling	Northing:	623715.50
Driller:	Jimmy Griffith	Easting:	1919025.14
Shaw Field Representative:	Eric Weaver	Shaw Project Number:	132288

AP1 PZ03

Top of Casing Elevation (ft): 640.79

Top of Casing Stickup (ft): 2.14

Land Surface Elevation (ft): 638.7

Approximate Diameter of Borehole (in): 3.5"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: None

Date: 12-8-08

Post Development: TOC

Date:

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 8.0'

Bottom of Screen Interval (ft):

Bottom of Piezometer (ft): 18.0'

Bottom of Borehole (ft): 18.0'

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14

Backfill Material: NA

Abandonment:

Date: 6/18/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).
If completed as well - see well construction diagram.

HTRW DRILLING LOG

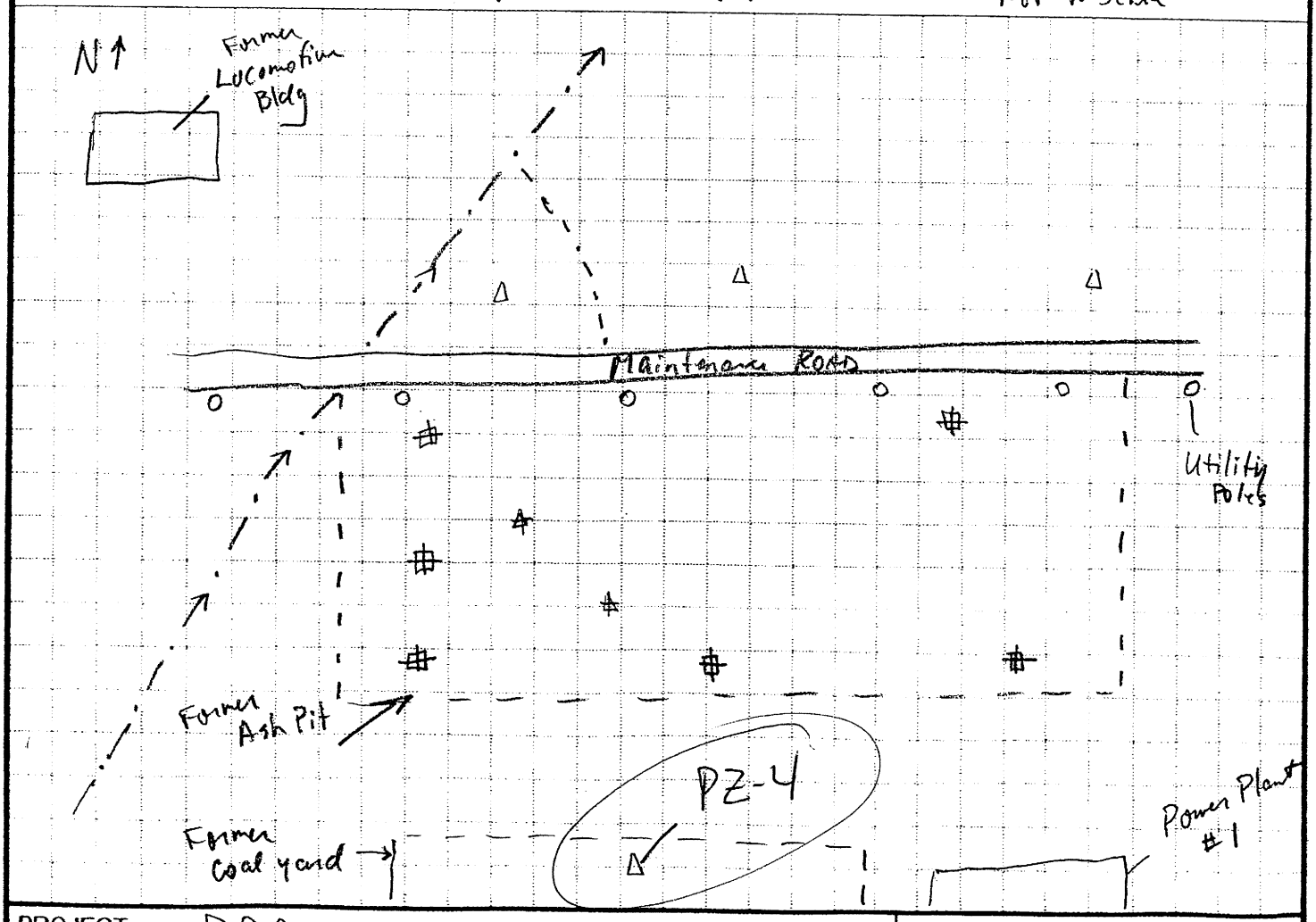
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: PZ-4
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 3 SHEETS
5. NAME OF DRILLER: Jimmy Griffith	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610 DT	
	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 640.9	Northing: 623368.95 Easting: 1918792.10
	10. DATE STARTED: 12/9/08	11. DATE COMPLETED: 12/9/08
12. OVERBURDEN THICKNESS: 19.6 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: 4 Ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: DRY	
14. TOTAL DEPTH OF HOLE: 19.6 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	PZ-4

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HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-4

Project: PBOW | Geologist: David Kresh | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Fill: ~~o~~ (Medium dense, (2.5Y 5/3) light olive brown, mottled (dark brown, brown), SAND, little silt (10%), moist)	SP	NM (rain)	NA	NA	4.1/5	Began drilling 12/9/08 1410 S-1 (0-5') 1410
	1							
	2							
	3	3						
		silty SAND	SM					Heavy steady rain
	4	4.1						
		Loose, very fine grain, SAND,	SP					Encountered gw 4 ft
	5	5.1				5		
		Black, homogenous, SILT, wet low plasticity	ml					S-2 (5-10') 1415
	6	6					5/5	~~Encountered gw 5 ft~~ DKK
		Brown, mottled (gray) 40% mottling, SILT, trace sand, moist to wet	ml					
	7							
	8							
	9							
	10							

Project: PBOW | Hole Number: PZ-4

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: PZ-4

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	Brown, mottled (gray), 40% mottling, SILT, trace sand, wet	ml	NM (Heavy rain)	NA	NA	5/5	S-3 (10-15') 1417
	11							
	12							
	13							
	14	14						
	15	Stiff, (2.5Y 4/1) dark gray, mottled (brown), high plasticity, CLAY, wet	Ch				4.6/4.6	S-4 (15-19.6) 1420
	16							
	17	mottling decreases w/ depth						
	18	Shale fragments						
	19							
	20	Refusal 19.6 ft Total Depth = 19.6 ft						

Project: PBOW | Hole Number: PZ-4

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Temporary Piezometer

API

Project:	PBOW	Piezometer Number:	PZ-4
Location:	Sandusky, OH	Site Location:	Ash Pit 1
Client:	USACE, Nashville, TN	Installation Date	12/9/08
Subcontractor:	Tri-State Drilling	Northing:	623,368.95
Driller:	Jimmy Griffith	Easting:	918 792.10
Shaw Field Representative:	David Kessler	Shaw Project Number:	132288

Top of Casing Elevation (ft): 641.23

Top of Casing Stickup (ft): 0.6

Land Surface Elevation (ft): 640.9

Approximate Diameter of Borehole (in): 3.5"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 4

Date: 12/9/08

Post Development: TOC

Date:

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 9.26

Bottom of Screen Interval (ft): 19.26

Bottom of Piezometer (ft): 19.40

Bottom of Borehole (ft): 19.60

Filter Pack Material: None

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14

Backfill Material: NA

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite Casing Removed

Completed as Well NA

Shaw

Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

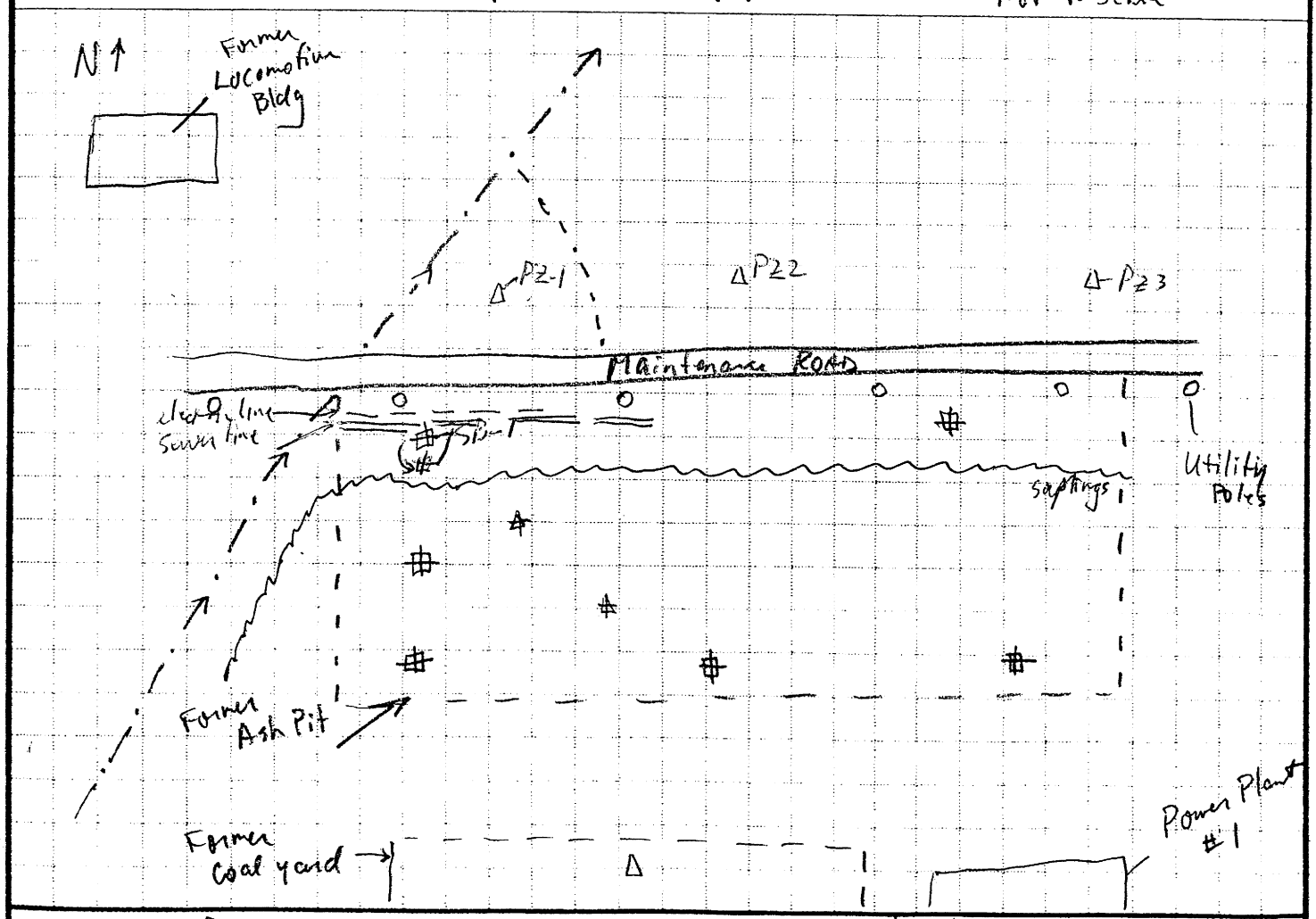
DISTRICT: Nashville, TN	HOLE NUMBER: SB-1	
1. COMPANY NAME: Shaw E+I	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 636.0	Northing: 623632.54 Easting: 1918680.82
	10. DATE STARTED: 12/8/08	11. DATE COMPLETED: 12/8/08
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: 6.5 ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 10 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	Pb Bs	SVOCs	metals	Nitro/Tic	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-1

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API SB-1

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		FILL: (Black; (2.5 y 2.5/1), very fine grain, SAND, little silt (15%), loose, organics, dry) 0.5	SM		NA	0.5		Began drilling 12/8/08 1125
						AP0001 1125	3.7/	
	1	Native soil: Loose, (10yr 4/6) dark yellowish brown, mottled (black, gray) very fine grain, SAND, trace silts (5%), organics, dry	SP	0.0		1.5 0-1' sample	5	Pushed 2 0.5' spoons for 0-1' TCC sample.
	2	mottling decreases w/depth						
	3	Loose, (10yr 5/6) yellowish brown, yellowish brown laminations	SP			3.5 AP0002 3.7		
	4	color grading to gray						
	5	silt/clay content increases w/depth				AP0002 1128		S-2 1130
	6	6.2				(represents 3.5-5.5' sample) TPH and the surface	5/ 5	V-6 Water encountered 6.5 ft
	7	Very stiff, (2.5 y 4/1) dark gray, homogeneous, CLAY, high plasticity, wet	CH					
	8					AP0003	3	
	9					1130		
	10	Total Depth = 10.0 ft					10	

Project: PBOW | Hole Number: SB-1

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API

HTRW DRILLING LOG

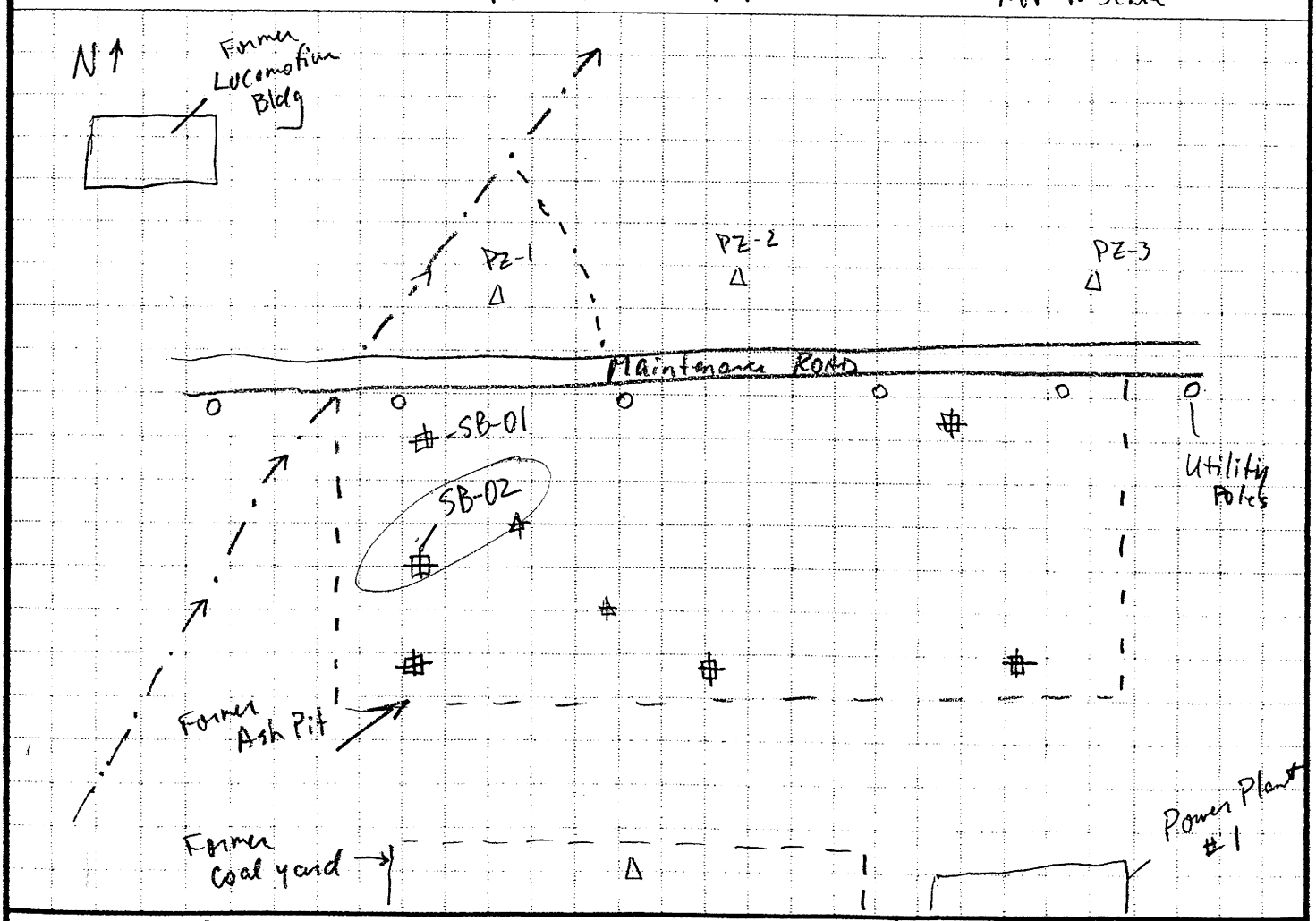
DISTRICT: Nashville, TN		HOLE NUMBER: SB02
1. COMPANY NAME: Shaw E+I	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 635.92	Northing: 623561.23 Easting: 1918686.10
	10. DATE STARTED: 12/8/08	11. DATE COMPLETED: 12/8/08
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: 5.5 ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 10 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	✓	PCB	Nitros	SVOCs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-02

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API SB-02

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	1	Black, very fine grain, CINDER/ASH, little (10%) coarse grain to pebble size cinders, white fine grain ash?, organics (roots), dry 1.6	NA	0.0	NA	AP0004 1330	3.8/5	Begin drilling 12/8/08 1330 No fill encountered S-1 (0-5') 1330
	2	Loose, (10YR 5/4), yellowish brown, very fine grain, SAND, homogeneous, dry, trace silt mottling 2.4-2.9; orangish brown 2.9	SP					
	3	Stiff, (2.5Y 4/1), dark gray, homogeneous, CLAY, high plasticity, wet	CH			AA005 1333	3 / 3.8	
	4							
	5							S-2 (5-10') 1335
	6			0.0			5/5	▽ GW encountered 5.5 ft
	7							
	8	8.8 ~~OKS~~ft LM cobble DFK				AP0006	8	
	9							
	10	Total Depth = 10 ft				1335	10	

Project: PBOW | Hole Number: SB-02

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HTRW DRILLING LOG

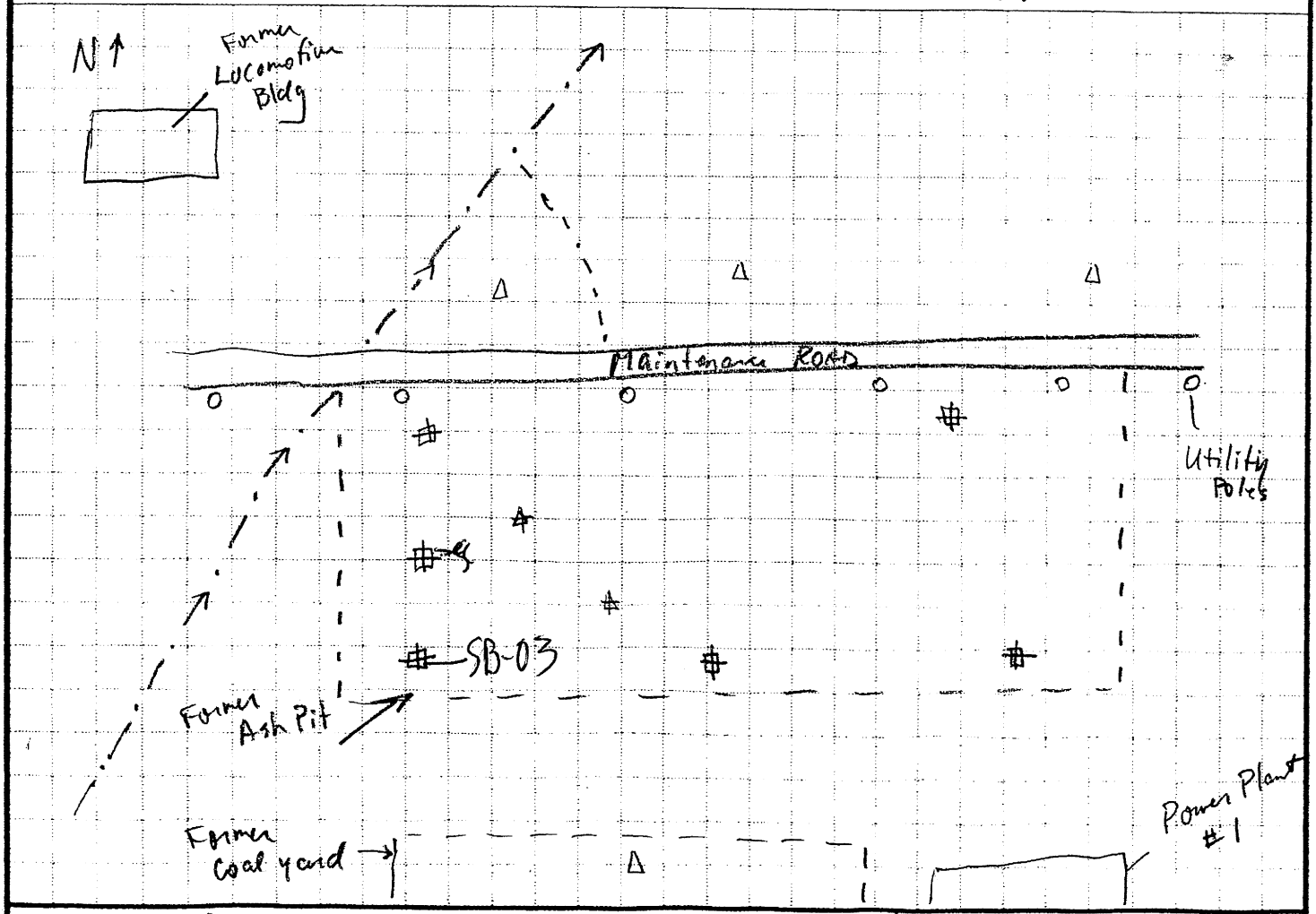
DISTRICT	Nashville, TN
HOLE NUMBER	SB-03
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	Tri-State Drilling
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	NASA Plum Brook Station, Sandusky, OH
5. NAME OF DRILLER	Jimmy Griffith
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6610DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.
8. HOLE LOCATION	See Sketch
9. SURFACE ELEVATION	638.41 Northing: 623475.30 Easting: 1918685.16
10. DATE STARTED	12/9/08
11. DATE COMPLETED	12/9/08
12. OVERBURDEN THICKNESS	unknown
15. DEPTH GROUNDWATER ENCOUNTERED	4 ft
13. DEPTH DRILLED INTO ROCK	-0-
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	10 ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	✓	PCBs	SVOCs	Nitros	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kresch

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-03

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API SB-03

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Loose, black, very fine grain, CINDERS/ASH, whitish/maroonish layers (1/4"-1/2" thick), 5% cinders, dry		NM rain	NA	AP0007 0	3/5	Began drilling 12/2/08 - 1350
	1					1		S1-(0-5') 1350
	2	2.2						Because only 3' recovered will push 3-5' directly for 3-5' sample
		Loose, (2.5Y 5/2) grayish brown SAND, fine grain, dry 2.7	SP					
	3	Stiff, (2.5Y 5/3) light olive brown, mottled (gray/strong brown), ~~high~~ low-medium plasticity, clayey SILT, wet	ml	NM rain		3 AP0008		V E recommended gw 4 ft
	4					1352		
	5					5	5/5	S-2 (5-10') 1355
	6							
	7	6.9 Stiff, (2.5Y 4/1) dark gray, homogeneous, high plasticity, CLAY, moist	Ch	NM rain				
	8					8 AP0009		
	9							
	10	Total Depth: 10 ft				1355 10		

Project: PBOW | Hole Number: SB-03

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HTRW DRILLING LOG

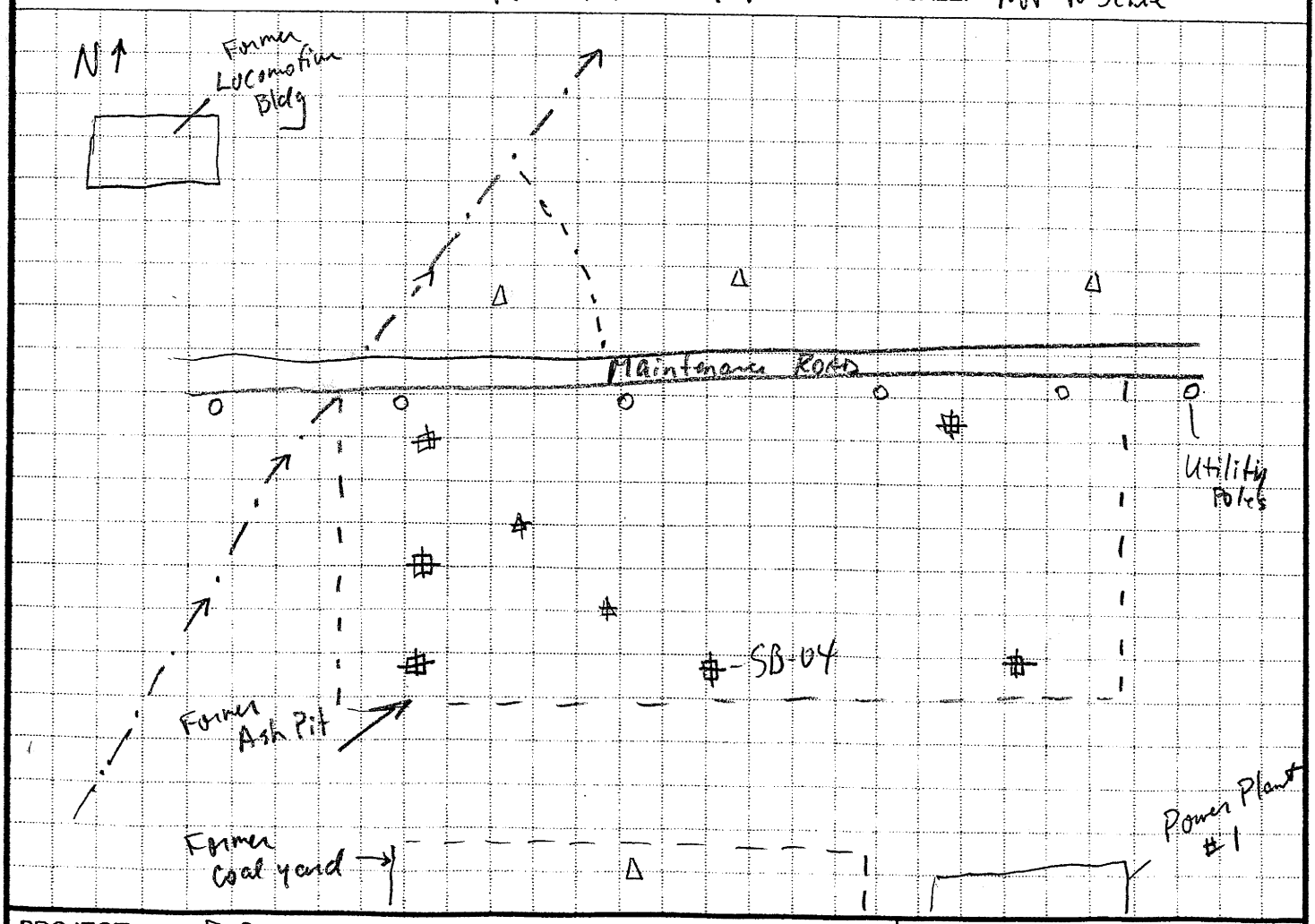
DISTRICT: Nashville, TN	HOLE NUMBER: SB-04	
1. COMPANY NAME: Shaw E+I	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610 DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 638.81 Northing: 623463.46 Easting: 1918828.82	
	10. DATE STARTED: 12/9/08	11. DATE COMPLETED: 12/9/08
12. OVERBURDEN THICKNESS: ~~10~~ Unknown	15. DEPTH GROUNDWATER ENCOUNTERED: 4 Ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 10 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	~~PCB~~ yes	PCBs	Nitros	SVOCs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kressler

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB04

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-04

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	1	Loose, black, very fine grain CINDERS/ASH, reddish, maroonish ash laminations (1/4-1/2"), 5% cinders, dry		NM (rain)	NA	AP0010 0910 0-1' sample	4/5	Began drilling 12/9/08 0910 S-1 (0-5') 0910
	2	2						
	3	soft, (2.5 Y 3/2) very dark grayish brown, no to low plasticity, SILT, color grades to 2.5 Y 4/2	ml			AP0011 AP0012 FD AP0002 FS 0912		Push 2 sleeves 0-5' ☑ Gw encountered 4 ft
	4					(represents 3-5' sample)		
	5	5.5						
	6	soft, (2.5 Y 5/3) light olive brown, mottled (gray, strong brown), high plasticity, clayey SILT, wet	mh	NM (rain)			5/5	S-2 0915 (5-10')
	7							
	8	8				AP0013		
	9	9 stiff, (2.5 Y 4/1) dark gray, mottled brown, high plasticity, CLAY, wet	ch			0915		
	10	Total Depth = 10 ft				10		

Project: PBOW | Hole Number: SB-04

API

HTRW DRILLING LOG

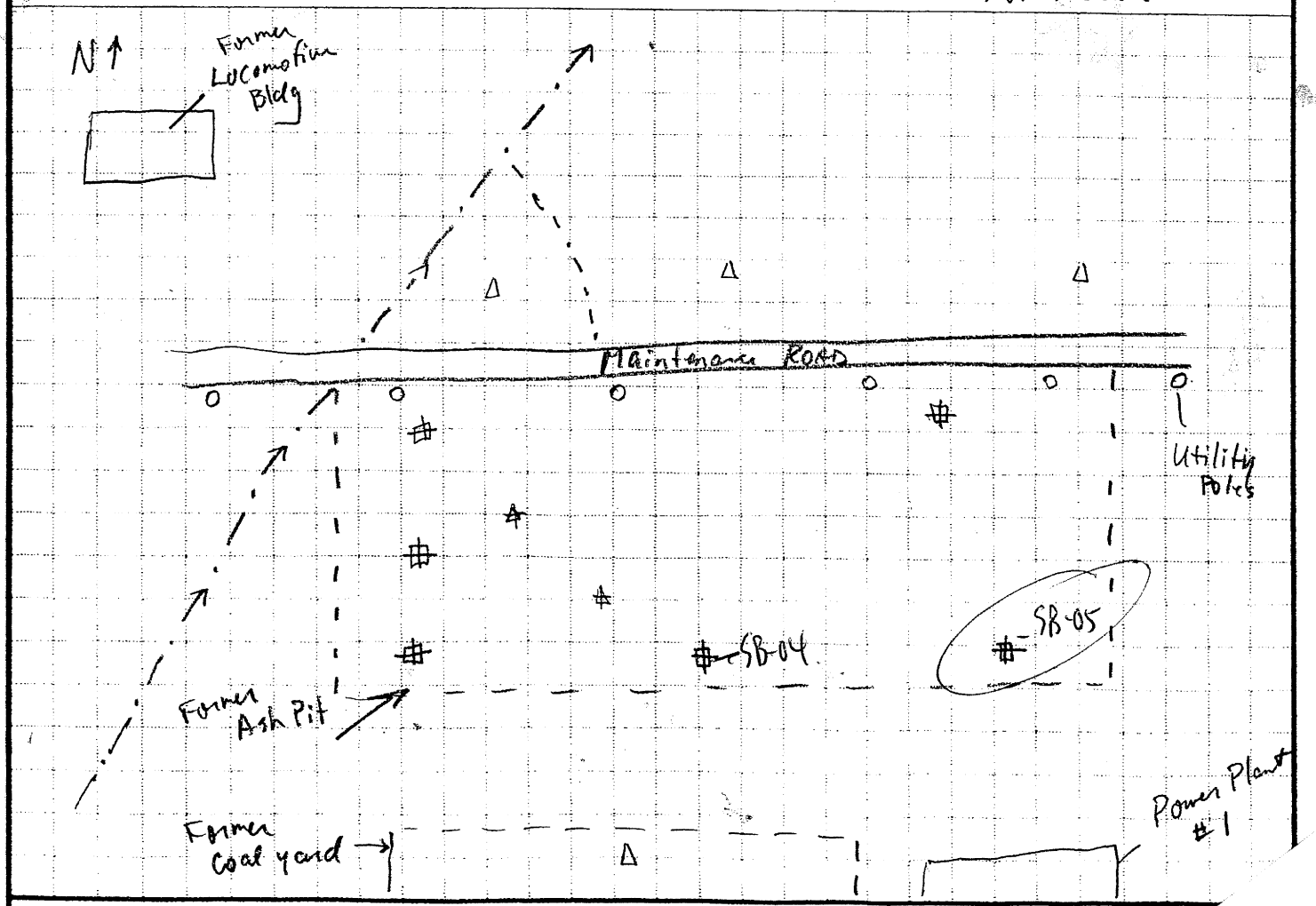
DISTRICT: Nashville, TN		HOLE NUMBER: SB-05
1. COMPANY NAME: Shaw E+I	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 638.35 Northing: 623455.17 Easting: 198962.03	
	10. DATE STARTED: 12/9/08	11. DATE COMPLETED: 12/9/08
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: ~4 ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 10 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	yes	PCBs	SVOC	Nitros	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kessel

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-05

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: APT SB-05

Project: PBOW

Geologist: D. Kessler

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	0	Black, loose, very fine grain, CINDERS/ASH, white ash 80%, 10% coarse grain cinders, dry			NA	AP0014 0835	3.7/5	Began drilling 12/9/08 0835 S-1 (0-5') 0835
	1.6	Soft, (2.5 y 3/2) v dk grayish brown, no to low plasticity, SILT, trace (2%) fine gravel fragments, dry	ml	0.0		AP0015 0837		
	4	Stiff, (2.5 y 4/2) dark grayish brown, mottled (reddish brown), high plasticity, SILT, wet	mh	NM Tan		(Terminate 3.5' sample) 3.7		GW estimated to be encountered at 4 ft
	8	Stiff, (2.5 y 4/2) dark grayish brown, high plasticity, CLAY wet	ch	NM Tan		AP0016 0840	4/5	S-2 0840 (5-10')
	10	Total Depth = 10 ft						

Project: PBOW

Hole Number: SB-05

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HTRW DRILLING LOG

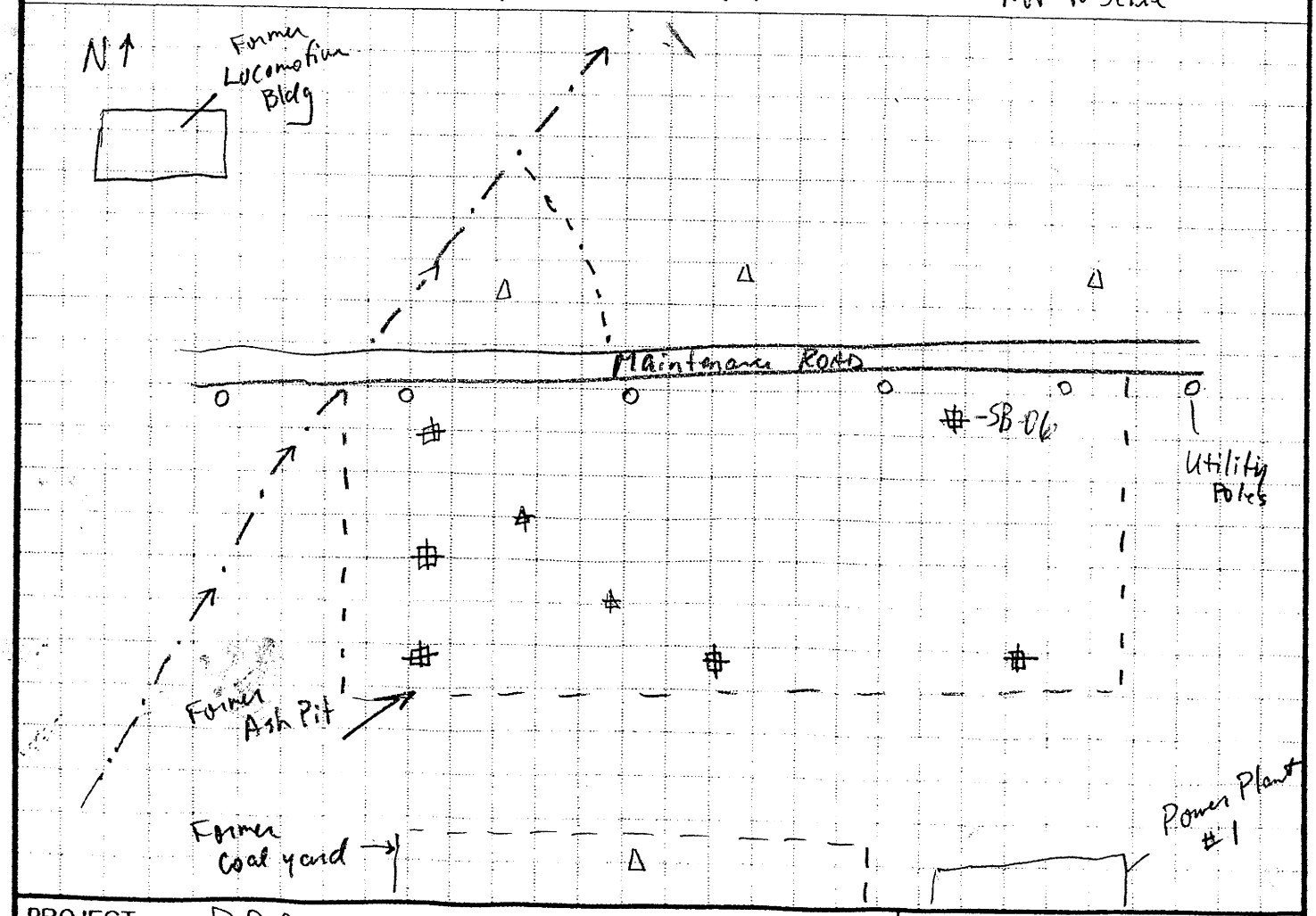
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: SB-06
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 2 SHEETS
5. NAME OF DRILLER: Jimmy Griffith	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics, Drove 2-inch macrocore with 5-ft long acetate liners.	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 635.23 MC 3	Northing: 623620.51 Easting: 1918930.44
	10. DATE STARTED: 12/8/08	11. DATE COMPLETED: 12/8/08
12. OVERBURDEN THICKNESS: Unknown	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 10 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	✓	PCBs	Nitros	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-06

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-06

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		ORGANICS (ROOTS) 0.1	N/A		NA			Program drilling 12/8/08
		Fill: (Loose, 7.5y (2.5/1), black, silty SAND, organics, dry) 0.4	sm				3.8/	
	1	Fill: (Stiff, (10YR 5/6) yellowish brown, silty SAND, 40% silt, dry 0.8	sm	0.8		0.8		S-1 (0-5')
				AP0017		AP0017	5.0	1550
		Black, very fine grain, CINDERS/ ASH, 2% cinders, white grain, fine grain material 1.8		1550 1.8		1550 1.8		
	2							
		Medium stiff, (10YR 4/2) very dark grayish brown, mottled (brown) 50% mottling and decreases w/ depth, Sandy SILT 40% very fine grain sand, low plasticity, moist	ml					~~wet~~
	3							
	4							
	5	5				5		
		Stiff, (10YR 4/2) dark grayish br, high plasticity, CLAY, trace shale fragments, dry	ch			AP0018		S-2 (5-10')
	6					1553 5.8 (3-5' sample)	5/5	1553 wet zone 5 ft, water?
	7							
	8					8		
						AP0019		
	9							
	10	Total Depth = 10 ft				1554 10		

Project: PBOW | Hole Number: SB-06

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HTRW DRILLING LOG

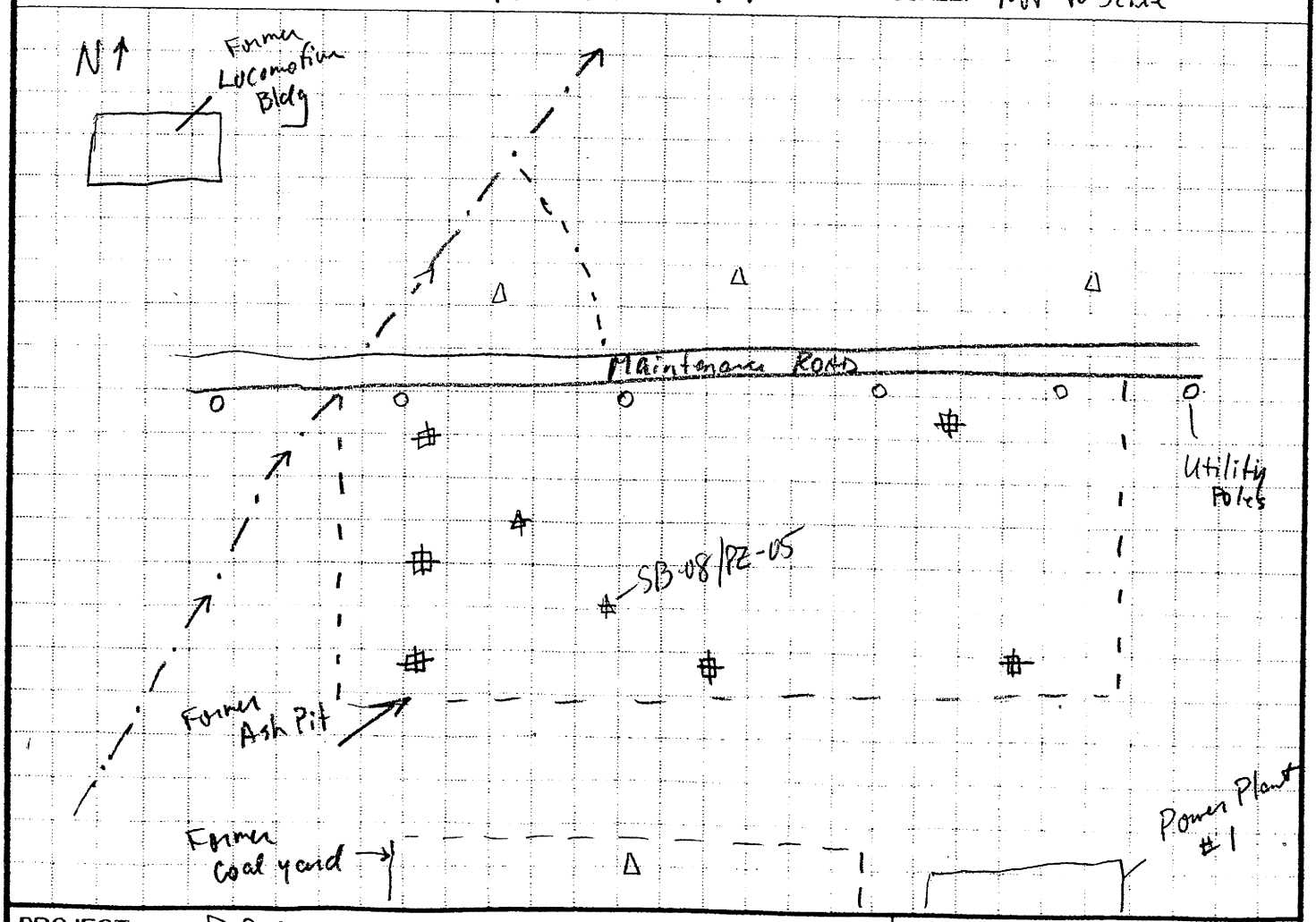
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: SB-08/PZ-05
	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 3 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 637.5 Northing: 623521.04 Easting: 1918801.67	
	10. DATE STARTED: 12/9/08	11. DATE COMPLETED: 12/9/08
12. OVERBURDEN THICKNESS: 19.2 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: 5.5 Ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:	
14. TOTAL DEPTH OF HOLE: 19.2 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	✓	PCBs	SVOCs	Nitross	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" piezo	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-08/PZ-05

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-08/PZ-05

Project: PBOW | Geologist: D. Kreisler | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
						0		
	1	Black, loose, fine grain, CINDERS/ASH, cinders (up to 1/2" diameter), brick fragments, maroonish color stratums & intermittently, dry		NM RAIN	NA	AP0023 AP0063 AP0057FS 5	3/5	Began drilling 9/12/08 S-1 1050 (0-5') Pushed 3@ 0-5' sleeves Pushed 2@ 3-5' sleeves
	2							
	3					3		
	4					AP0024 AP0024MS AP0024MSD		Because no recovery in first 3 spoons, push 2 spoons specifically 3-5' (3-5')
	5					1055 5		
		5.5		NM rain				S-2 (5-10') UOV ▽ GW encountered 5.5 ft
	6	~~Soft~~ Stiff, (10YR 4/1) dark gray, mottled brown (30%), high plasticity, silty CLAY, (40%), moist	CH					
	7	consistency increasing w/ depth to very stiff						
	8					8 AP0025		
	9					UOV		
	10					10		

Project: PBOW | Hole Number: SB-08/PZ-05

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Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-08/PZ-05

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	Very stiff. (10YR 4/1) dark gray, mottled (brown) 30%, high plasticity, silty CLAY, moist	ch	NM rain	NA	NA	5/5	S-3 (10-15') 1125
	11							
	12							
	13							
	14	silt content decreasing w/ depth, mottling decreases.						
	15	Coarse grain sand 15-17 ft w/ CLAY 30%						S-4 1130
	16						~~4.8~~/ ~~4.5~~	
	17						4.2/4.2	
	18	Shale fragments very coarse						
	19	Refusal at 19.2 ft Total Depth = 19.2 ft						
	20							

Project: PBOW | Hole Number: SB-08/PZ-05

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	SB-08/PZ-05
Location:	Sandusky, Ohio	Site Location:	AP 1
Client:	USACE, Nashville, TN	Installation Date	12/9/08
Subcontractor:	Tri-State Drilling	Northing:	623521.04
Driller:	Jimmy Griffith	Easting:	1918801.67
Shaw Field Representative:	DAVID Kuester	Shaw Project Number:	132288

Top of Casing Elevation (ft): 638.30

Top of Casing Stickup (ft): 0.9

Land Surface Elevation (ft): 637.5

Approximate Diameter of Borehole (in): 3.5

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 5.5 ft

Date: 12/9/08

Post Development: TOC

Date: —

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): 9.1

Bottom of Screen Interval (ft): 19.10

Bottom of Piezometer (ft): 19.24

Bottom of Borehole (ft): 19.2

Filter Pack Material: None

Manufacturer:

Product Name: ~~DSI~~

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: 0.14

Backfill Material: None

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted (Bentonite) (Casing Removed)

Completed as Well NA

Shaw
Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

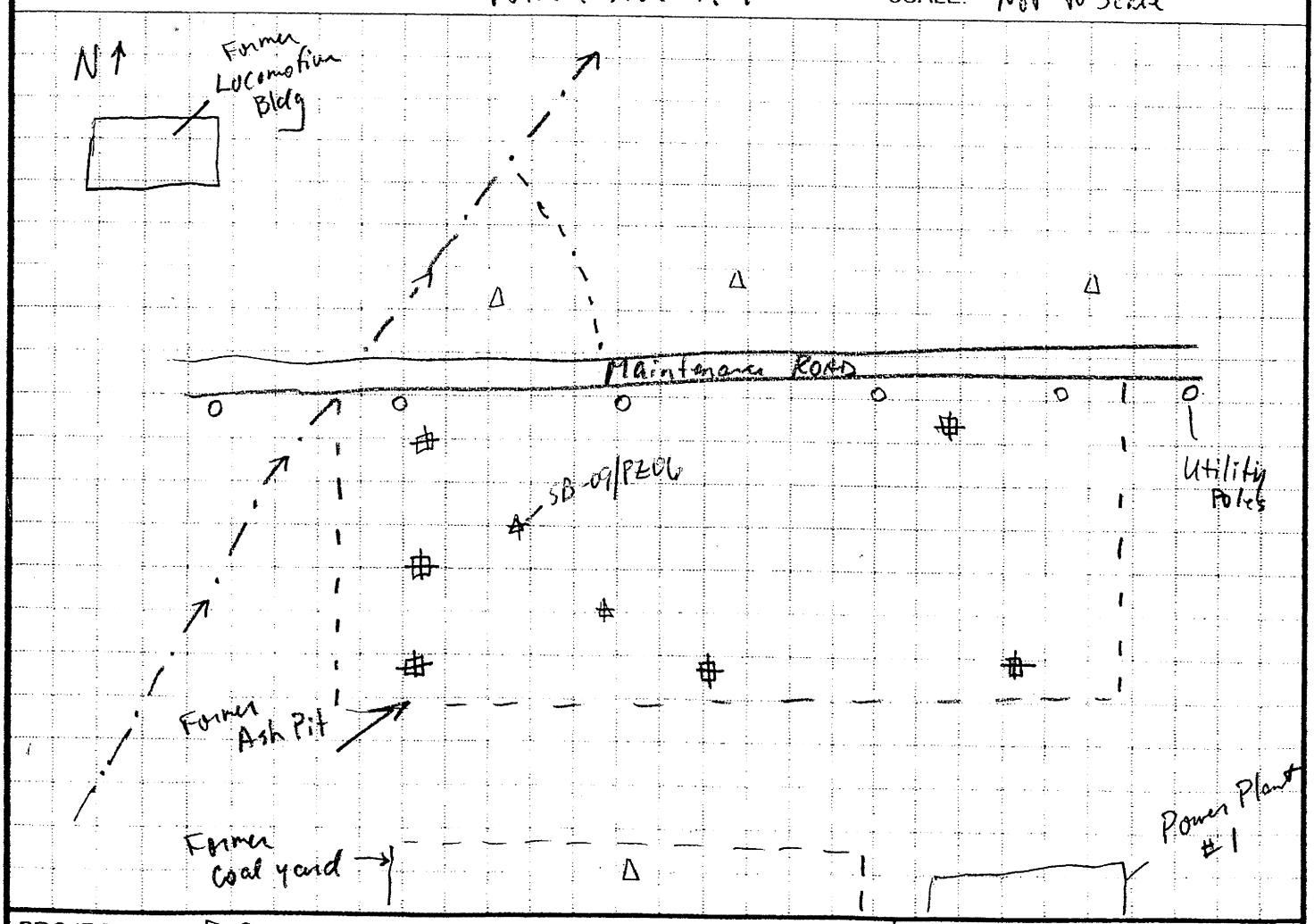
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: SB-09/PZ-06
	2. DRILL SUBCONTRACTOR: Tri-State Drilling	SHEET 1 OF 3 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
5. NAME OF DRILLER: Jimmy Griffith	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Surface and Subsurface initially cleared with geophysics. Drove 2-inch macrocore with 5-ft long acetate liners.	8. HOLE LOCATION: See Sketch	
	9. SURFACE ELEVATION: 634.5	Northing: 623585.48 Easting: 1918735.41
	10. DATE STARTED: 12/8/08	11. DATE COMPLETED: 12/8/08
12. OVERBURDEN THICKNESS: 19.3 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: 5 Ft	
13. DEPTH DRILLED INTO ROCK: -0-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 2.48 ft 12/15/08 1040	
14. TOTAL DEPTH OF HOLE: 19.3 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	PCBs	Nitros	Metals	SVOCs	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	1" Piezo	David Kessler

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	SB-09/PZ-06

Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API SB-09/PZ-06

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		ORGANICS	OL		NA	AP0026 0		Begin drilling 12/8/06 1405
	1	Black, very fine grain, CINDER/ASH, 10% cinders, fine grain, white ash, dry				1405 (0-1' sample)	4/5	S-1 (0-5') 1405
	2	1.8 Medium stiff, (10YR 3/4) dark yellowish brown, low plasticity, silty CLAY, mottled (gray), moist	CL	0.0				No fill encountered. Breathing Air: PID = 0.0 ppm LEL = 0% H_2S = 0 ppm CO = Malfunctioning
	3					3 AP0027		
	4					1410 (3.5' sample)		
	5	5						Encountered gw 5.0'
	6	Medium stiff to stiff, (2.5Y 4/1) dark gray, homogeneous, silty CLAY, high plasticity, wet 10-15% shale fragments, very coarse to pebble size grain	CH				5/5	S-2 (5-10') (~~10-15'~~) 1415
	7			0.0				
	8					8 AP0028 AP0028-MS AP0028MSD		
	9					AP0055 (FD) AP0061 (FS)		
	10					1415 10		

Project: PBOW | Hole Number: SB-09/PZ06

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Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: SB-09/PZ-06

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	10	Stiff to hard, (2.5Y 4/1) dark gray, high plasticity, CLAY, homogeneous, 10% shale fragments, very coarse to pebbly size, wet	ch	0.0	NA	NA	3.8/ 5	S-3 (10-15') 1500
	11							
	12							
	13							
	14							
	15						4.3/ 4.3	15
	16							
	17							
	18							
	19							
	20	Sifton Refusal 19.3 ft Total Depth = 19.3 ft						

Project: PBOW | Hole Number: SB-09/PZ-06

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Temporary Piezometer

Project:	PBOW	Piezometer Number:	PZ-06
Location:	API - Sandusky, OH	Site Location:	API
Client:	USACE, Nashville, TN	Installation Date	12/8/08
Subcontractor:	Tri-State Drilling	Northing:	623585.48
Driller:	Jimmy Griffith	Easting:	1918735.41
Shaw Field Representative:	David Kessler	Shaw Project Number:	132285

Top of Casing Elevation (ft): 635.15

Top of Casing Stickup (ft): 0.6

Land Surface Elevation (ft): 634.5

Approximate Diameter of Borehole (in): 3 1/2"

Well Casing Diameter (in): 1"

Depth to Water (ft):

During Drilling: 5'

Date: 12/8/08

Post Development: 2.44 4 TOC

Date: 12/15/08

Top of Filter Pack (ft): NA

Top of Screen Interval (ft): ~~18.46~~ DAK 9.46

Bottom of Screen Interval (ft): ~~TS~~ DAK 19.46

Bottom of Piezometer (ft): 19.60

Bottom of Borehole (ft): 19.3

Filter Pack Material: NA

Manufacturer:

Product Name:

Size:

Installation: Prepacked Screen Filter Sock

Well Casing:

Manufacturer: DSI

Type: PVC

Diameter (in): 1"

Well Screen Casing:

Manufacturer: DSI

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap Factory slot

Sump/End Cap: 0.14'

Backfill Material: NA

Abandonment:

Date: 7/6/09

Procedure: Natural fill Grouted Bentonite

Casing Removed

Completed as Well NA

Shaw

Shaw E & I, Inc.

Depths and heights are referenced to ground surface unless specified TOC.

All elevations are referenced to MSL (NAVD 88).

If completed as well - see well construction diagram.

HTRW DRILLING LOG

DISTRICT	Nashville, TN
HOLE NUMBER	AP3-SB01
1. COMPANY NAME	USACE
2. DRILL SUBCONTRACTOR	Shaw Environmental
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	NASA/Plum Brook Ordnance Works, Sandusky, Ohio
5. NAME OF DRILLER	Chris Strempka/Brian Tiell
6. MANUFACTURER'S DESIGNATION OF DRILL	2" Stainless Steel Hand Auger
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" SS Hand Auger
8. HOLE LOCATION	Ash Pit 3
9. SURFACE ELEVATION	
10. DATE STARTED	8/19/09
11. DATE COMPLETED	8/19/09
12. OVERBURDEN THICKNESS	Unknown
15. DEPTH GROUNDWATER ENCOUNTERED	1.5 ft Perched?
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	5.0 ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

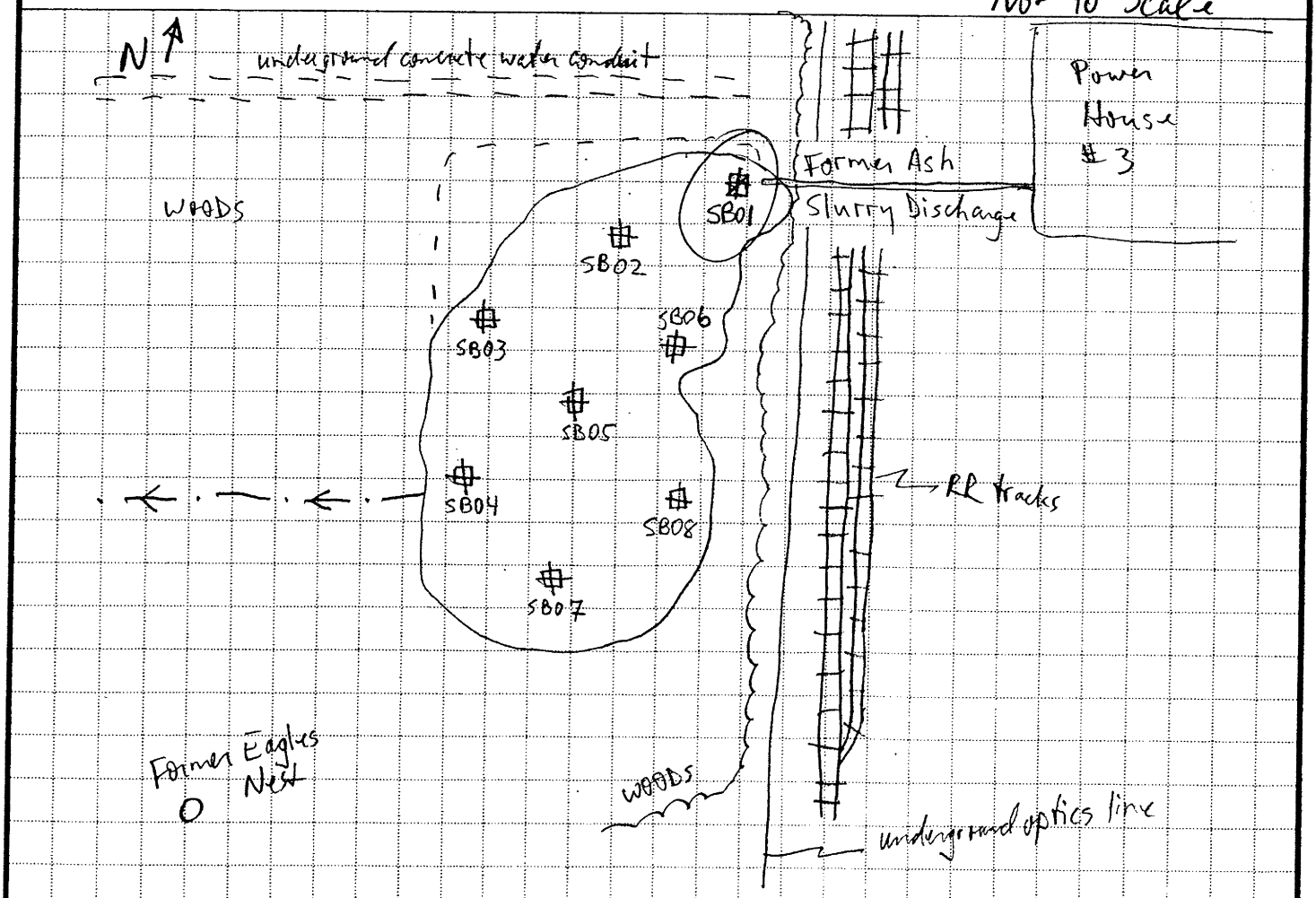
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB01

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP3-SB01

Project: ~~WWOW~~ PBOW

Geologist: C. Strempka

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		Light brown, fine grain SAND, some silt, moist		0	NA	AP0032 1355		Began drilling 8/18/09
	1	Black at 1.2'; fine grain SAND and SILT, moist	SM	56		1'	100%	
	2	Brown and gray, fine SAND and SILT, wet at 1.5', little clay 2.5						▽ 1.5' perched water
	3	Gray, clayey SILT, little, fine grain, sand, moist to silty CLAY, brown/gray, moist	CL	0		AP0033 1425	3'	
	4			0				
	5						5'	
		End of Boring 5 ft Total Depth = 5.0 ft						
	6							
	7							
	8							
	9							
	10							

Project: ~~WWOW~~ PBOW

Hole Number: AP3-SB01

HTRW DRILLING LOG

1. COMPANY NAME: USACE	DISTRICT: Nashville, TN	HOLE NUMBER: AP3-SB02
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF SHEETS 2
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 8/19/09	11. DATE COMPLETED: 8/19/09
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: 1.2 Ft	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 3 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

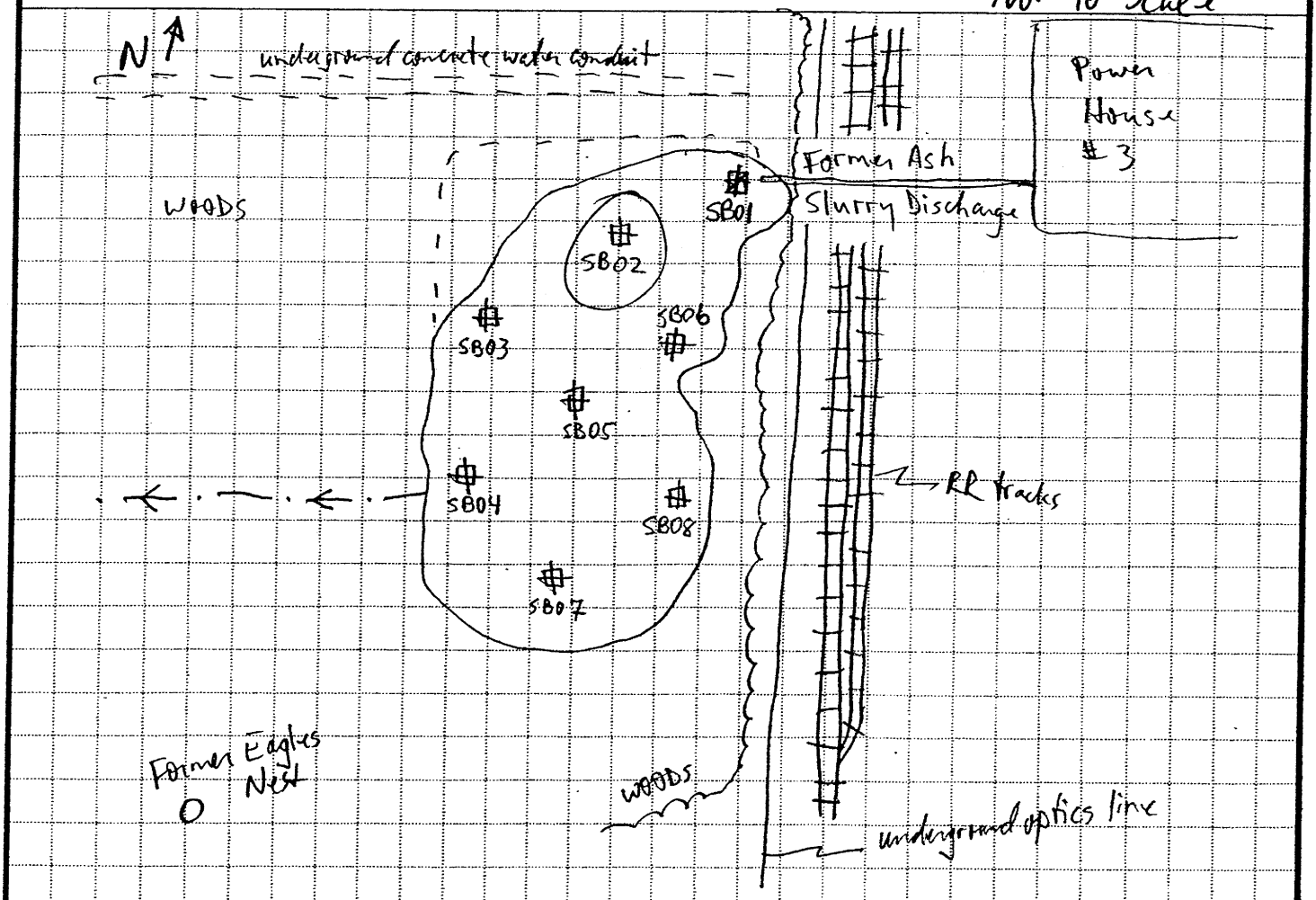
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB02

HTRW DRILLING LOG (continuation sheet)

C. Strempka ~~[illegible]~~

Hole Number: AP3-SB02

Project: ~~WVOW~~ PBOW

Geologist: ~~[illegible]~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		Brown/gray, clayey SAND, fine grain sand, moist	SM	0	NA	AP0036 1540	100%	Began drilling 8/19/09
	1	1.2'				1'	1.2'	
		Black, fine to medium grain, SAND with ASH, mois to wet	SP	0		AP0037 1550		▽ 1.2'
	2	2.3'				2.3		
		Gray, silty CLAY, some sand, moist to wet	CL	0				
	3							
		End of Boring Total Depth = 3 ft						
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WVOW~~ PBOW

Hole Number: AP3-SB02

HTRW DRILLING LOG

1. COMPANY NAME: USACE	DISTRICT: Nashville, TN	HOLE NUMBER: AP3-SB03
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF 2 SHEETS
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 8/19/09	11. DATE COMPLETED: 8/19/09
12. OVERBURDEN THICKNESS: Unknown	15. DEPTH GROUNDWATER ENCOUNTERED: Not Encountered	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 2 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

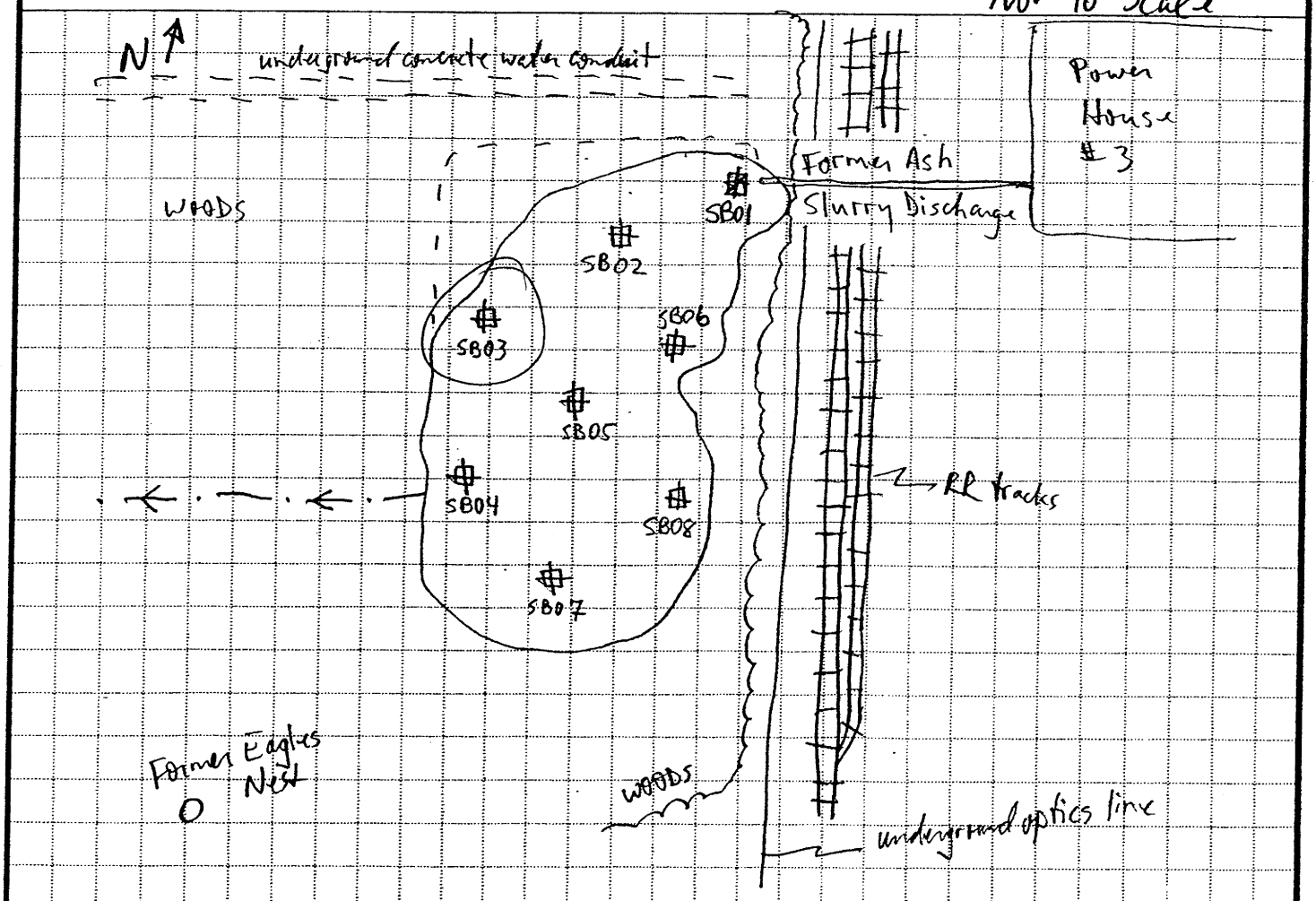
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB03

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP3-SB03

Project: ~~WWOW~~ PBOW

Geologist: C. Strempka ~~[redacted]~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		ORganics, brown, moist 0.2		0	NA	0.2		Began drilling 8/19/09
	1	Black, fine to medium grain, SAND and ASH, moist 1.7	SP	0		AP0039 AP0040MS AP0040MSD 1655 1.7	100%	
	2	Gray, silty CLAY, some sand, moist	CL	0				
		End of Boring Total Depth = 2 ft						
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WWOW~~ PBOW

Hole Number: AP3-SB03

HTRW DRILLING LOG

1. COMPANY NAME: USACE	DISTRICT: Nashville, TN	HOLE NUMBER: AP3-SB04
	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 8/21/09	11. DATE COMPLETED: 8/21/09
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 1.5 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

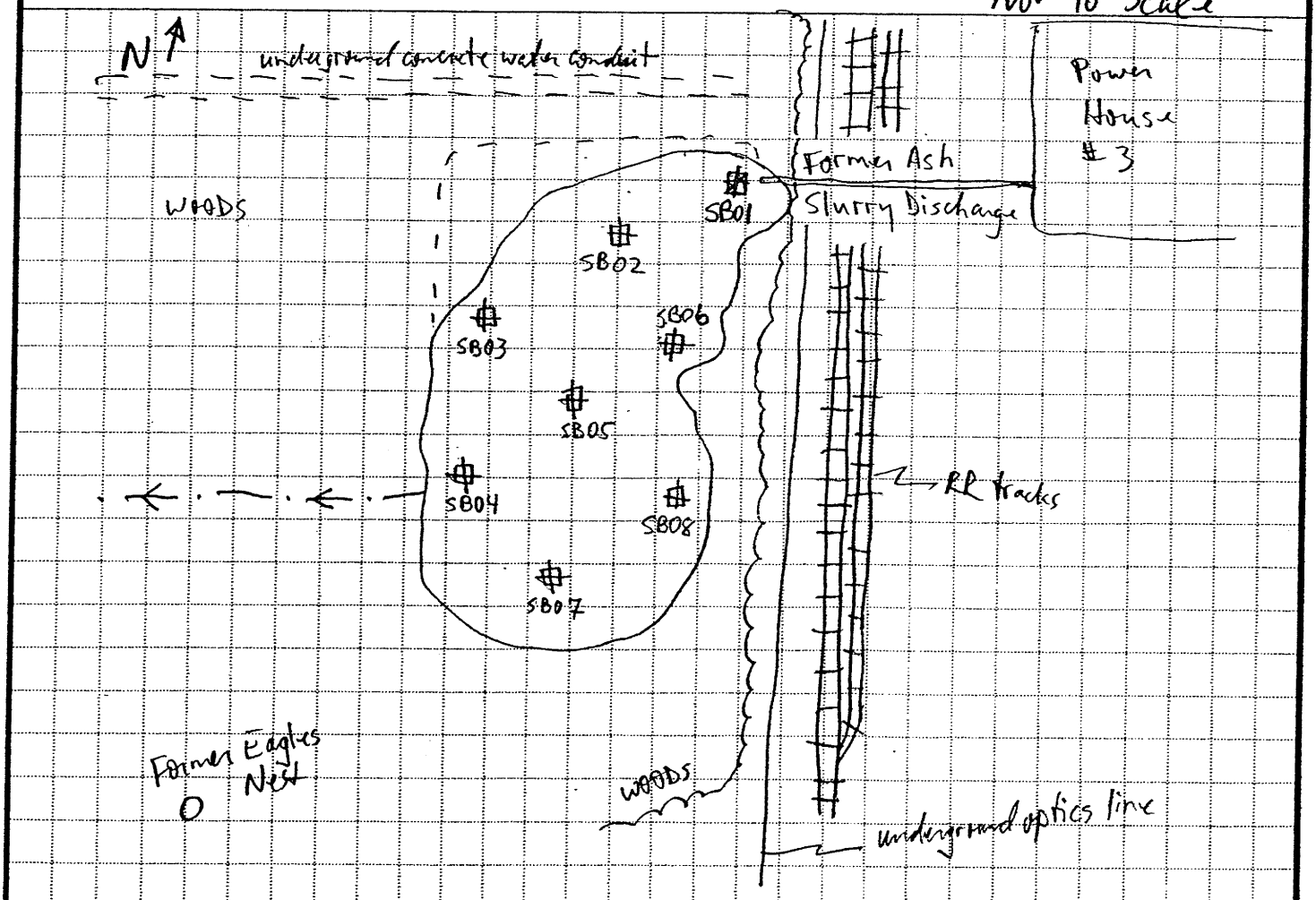
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB04

HTRW DRILLING LOG (continuation sheet)

C. Strempka

Hole Number: AP3-SB04

Project: ~~WWOW~~ PBOW

Geologist: ~~[illegible]~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		organic layer under green grass 0.3	X	0	NA	0.3 AP0042 1020	100%	Began drilling 8/21/09
		Fine grain, SAND with ASH, moist 0.8	SP					
	1	Gray, clayey SAND, brown mottling.	SM			0.8 AP0043 1030		
		End of Boring Total Depth = 1.5 ft						
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WWOW~~ PBOW

Hole Number: AP3-SB04

HTRW DRILLING LOG

DISTRICT: Nashville, TN		HOLE NUMBER: AP3-SB05
1. COMPANY NAME: USACE	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 8/21/09	11. DATE COMPLETED: 8/21/09
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: Not encountered	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 2 ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

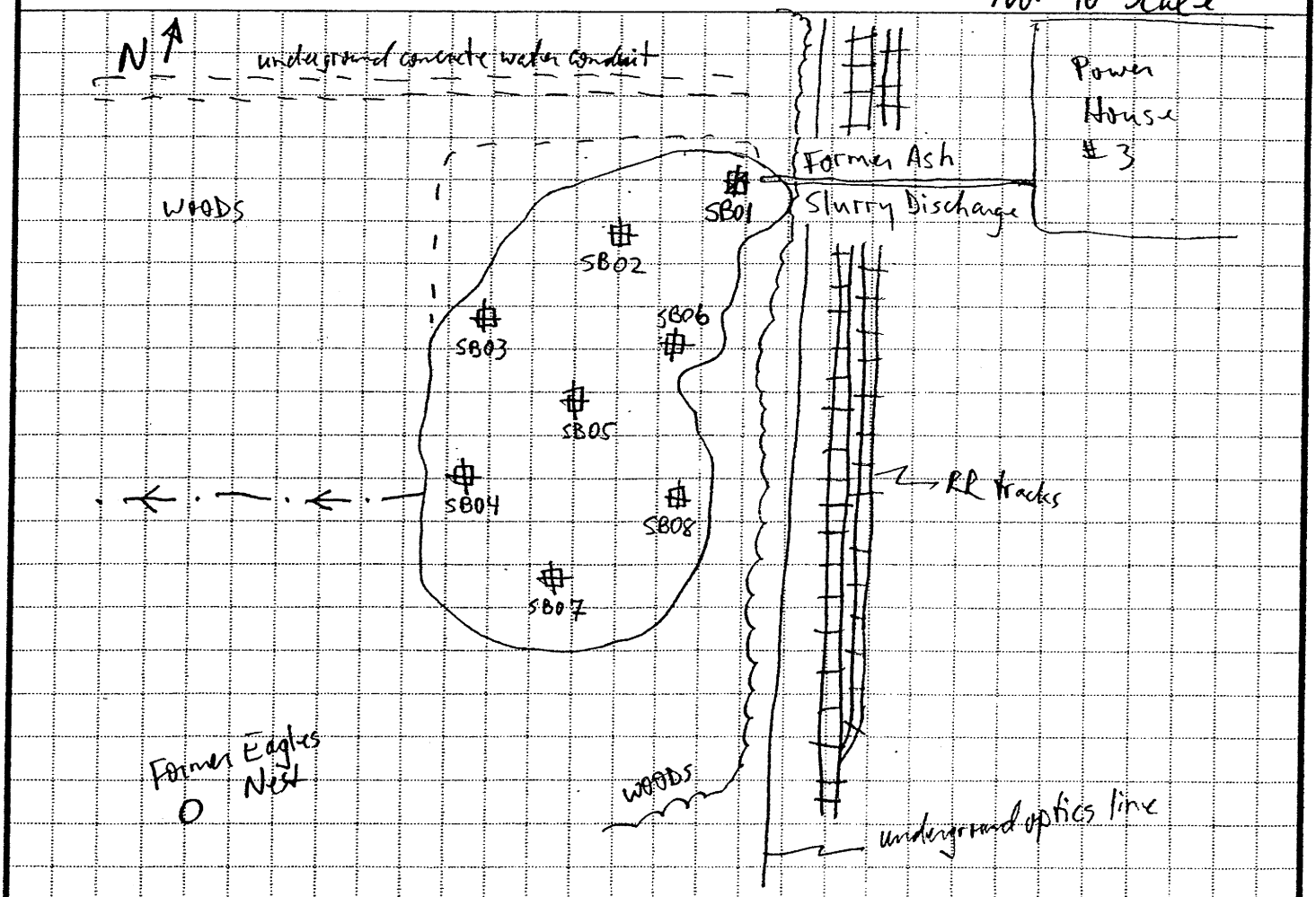
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB05

HTRW DRILLING LOG (continuation sheet)

C. Strempka

Hole Number: AP3-SB05

Project: ~~WVOW~~ PBOW

Geologist: ~~David Keesler~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		Brown, organic layer 0.3	X	0	NA	0.3'		Began drilling 8/21/09
		Black, fine to medium grain, SAND with Ash, moist to wet 1.0	SP	0		AP0045 1115 1'	100	
	1	Gray, mottled (brown), clayey SILT, fine grain sand, moist	ml	0		AP0046 1126		
	2	End of Boring Total Depth = 2 ft						
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WVOW~~ PBOW

Hole Number: AP3-SB05

HTRW DRILLING LOG

DISTRICT: Nashville, TN		HOLE NUMBER: AP3-SB06
1. COMPANY NAME: USACE	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 8/20/09	11. DATE COMPLETED: 8/20/09
12. OVERBURDEN THICKNESS: unknown	15. DEPTH GROUNDWATER ENCOUNTERED: 2.0 ft	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 2.7 Feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

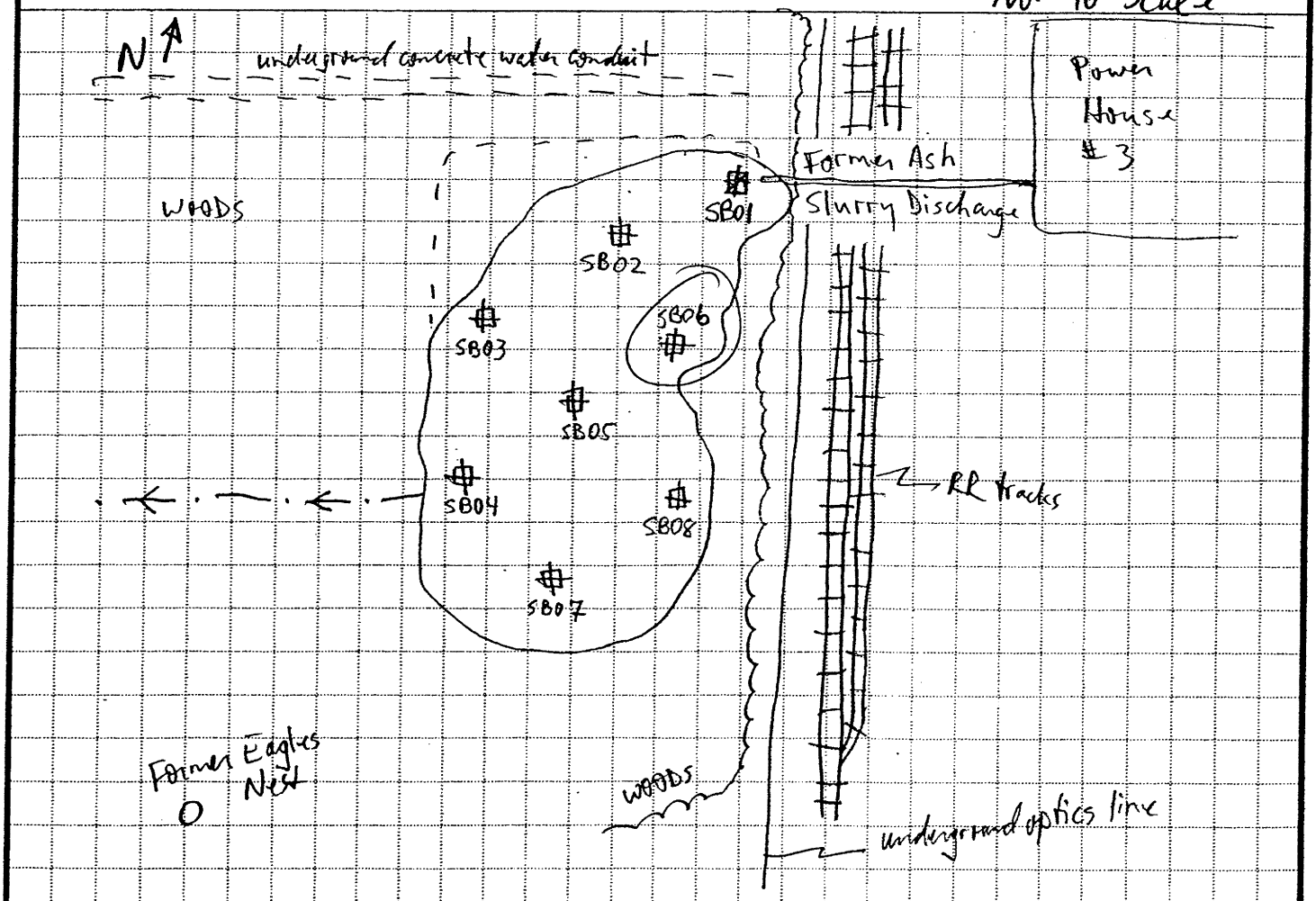
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB06

HTRW DRILLING LOG (continuation sheet)

C. Strempka

Hole Number: AP3-SB06

Project: ~~AWOW~~ PBOW

Geologist: ~~David Kessler~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		ORganic layer with SILT 0.2	~~ml~~	0	NA	0.2'		Began drilling 8/20/09
		Brown/Black, fine to med grain SAND and mixture of ASH	SP	0		AP0048 1530		
	1	Color change at 1.0'; Black, gray, fine to medium grain SAND and mixture of ASH, moist		0		1' AP0049 1540		
	2	Gray, silty CLAY, mottled (brown), moist to wet	CL	0		2' AP0061 1645		▽ 2.0'
	3	End of Boring Total Depth = 2.7 ft				2.7		
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~AWOW~~ PBOW

Hole Number: AP3-SB06

HTRW DRILLING LOG

DISTRICT: Nashville, TN		HOLE NUMBER: AP3-SB07
1. COMPANY NAME: USACE	2. DRILL SUBCONTRACTOR: Shaw Environmental	SHEET 1 OF 2 SHEETS
3. PROJECT: PBOW	4. LOCATION: NASA/Plum Brook Ordnance Works, Sandusky, Ohio	
5. NAME OF DRILLER: Chris Strempka/Brian Tiell	6. MANUFACTURER'S DESIGNATION OF DRILL: 2" Stainless Steel Hand Auger	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SS Hand Auger	8. HOLE LOCATION: Ash Pit 3	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 8/21/09	11. DATE COMPLETED: 8/21/09
12. OVERBURDEN THICKNESS: Unknown	15. DEPTH GROUNDWATER ENCOUNTERED: Not encountered	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 2.0 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

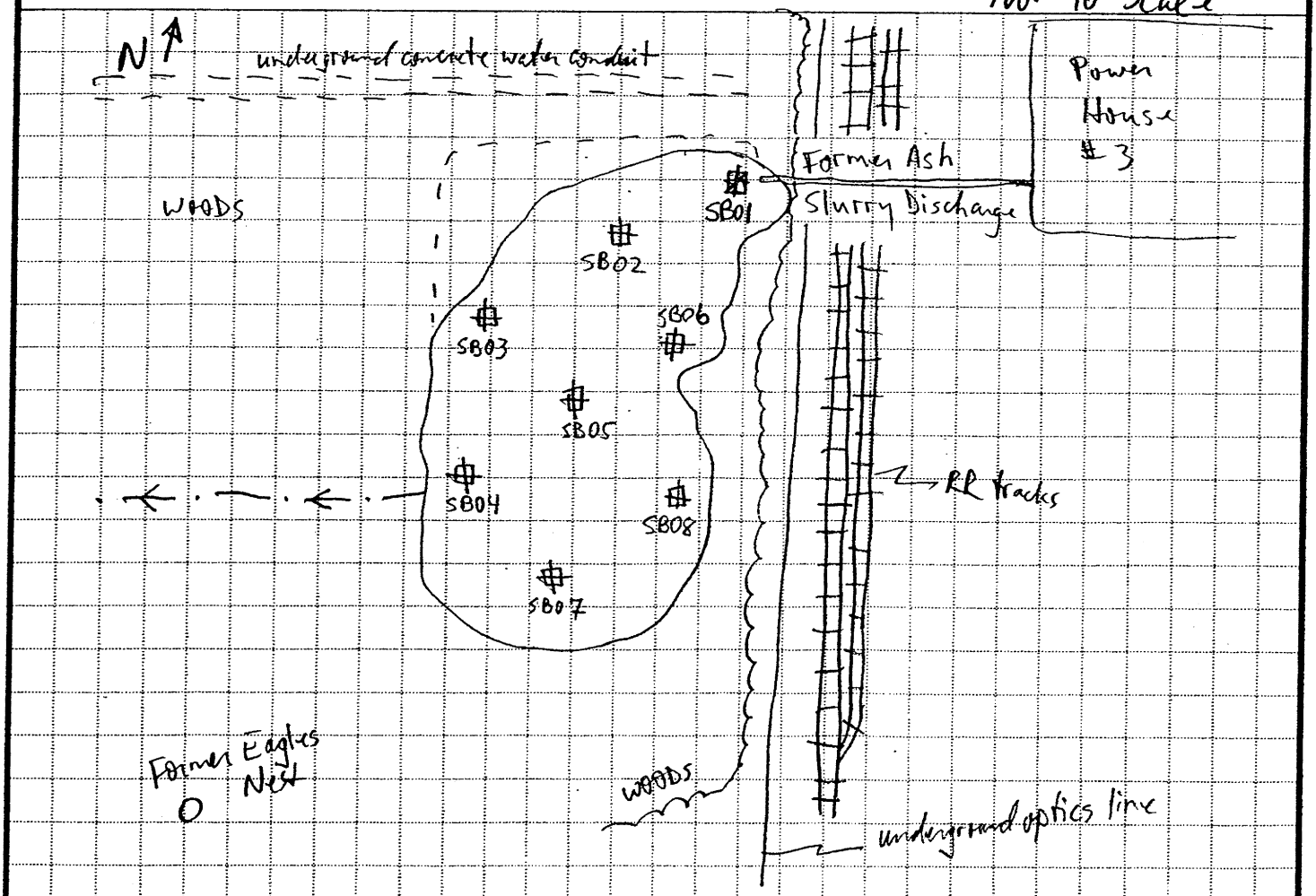
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	HOLE NO.
PBOW	AP3-SB07

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP3-SB07

Project: ~~WWOW~~ PBOW

Geologist: ~~David Koester~~ C. Strempka

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		Gray / Black with vegetation, organic material, clayey SILT, moist to wet		0	NA	AP0051 0905 0'	100%	Began drilling 8/21/09
	1	Gray, mottled (brown), silty CLAY, moist	Cl			1' AP0052 AP0059 AP0060 0920 2'		*No surface vegetation
	2	End of Boring Total Depth - 2.0 ft						
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WWOW~~ PBOW

Hole Number: AP3-SB07

HTRW DRILLING LOG

DISTRICT	Nashville, TN
HOLE NUMBER	AP3-SB08
1. COMPANY NAME	USACE
2. DRILL SUBCONTRACTOR	Shaw Environmental
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	NASA/Plum Brook Ordnance Works, Sandusky, Ohio
5. NAME OF DRILLER	Chris Strempka/Brian Tiell
6. MANUFACTURER'S DESIGNATION OF DRILL	2" Stainless Steel Hand Auger
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" SS Hand Auger
8. HOLE LOCATION	Ash Pit 3
9. SURFACE ELEVATION	
10. DATE STARTED	8/21/09
11. DATE COMPLETED	8/21/09
12. OVERBURDEN THICKNESS	unknown
15. DEPTH GROUNDWATER ENCOUNTERED	0.3 ft
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	2.0 ft
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

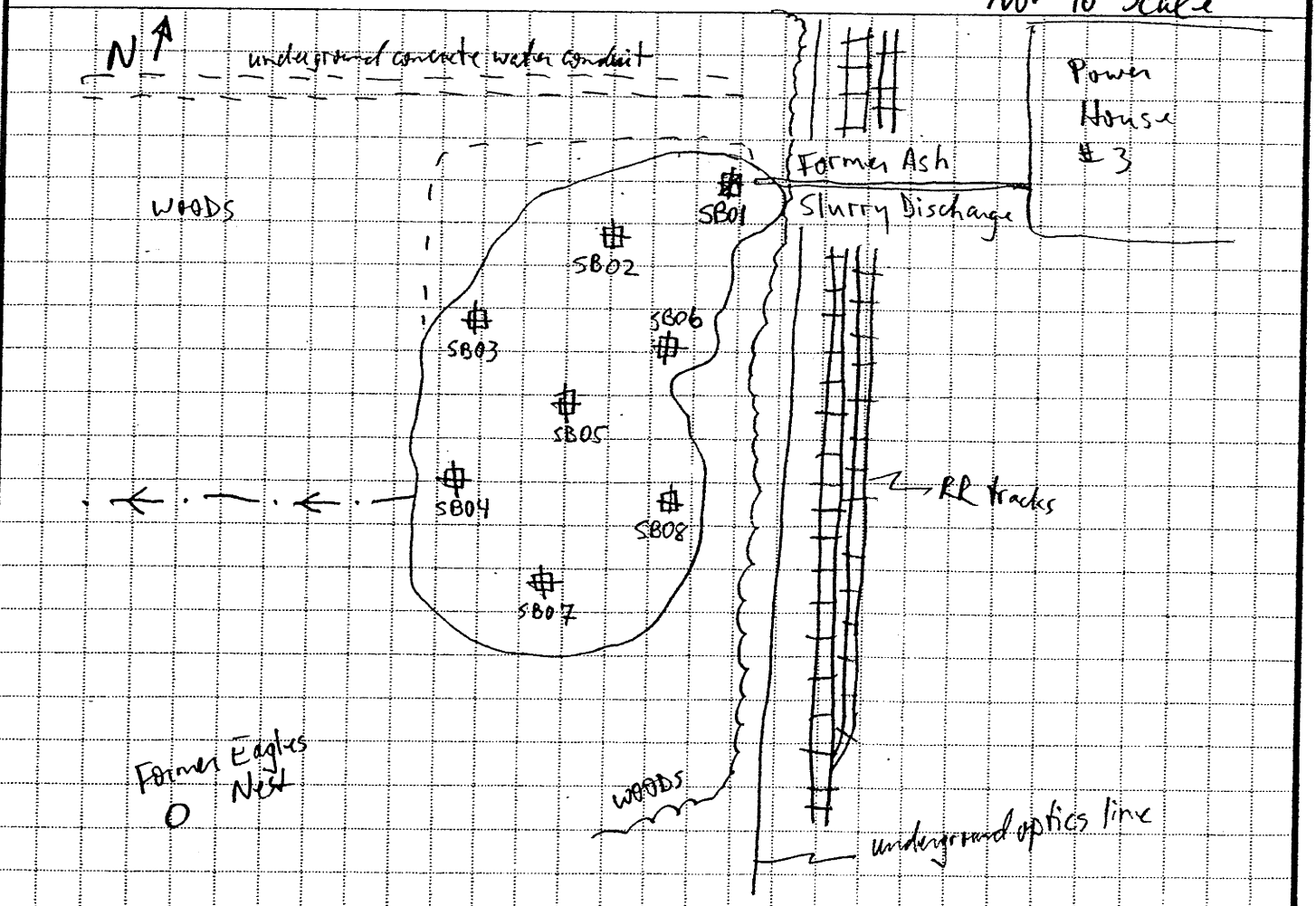
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	~~VOC~~	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	PCBs	yes	Nitroaromatic	Metals	SVOC	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	yes	NA	NA	Chris Strempka

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



PROJECT	PBOW	HOLE NO.	AP3-SB08

HTRW DRILLING LOG (continuation sheet)

C. Strempka

Hole Number: AP3-SB08

Project: ~~WVOW~~ PBOW

Geologist: ~~David Kessler~~

Sheet 2 of 2

Elev (ft)	Depth (ft)	Description of Materials	USCS/	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery %	Remarks
		Organics, brown, silt 0.3	X	0		0.3'		Began drilling 8/21/09
		Black, fine to medium grain, SAND and ASH, wet 1.0	SP	0	NA	AP0054 1330 AP0056 AP0057 1'	100%	▽ 0.3'
	1	Gray, mottled (brown), clay with SILT, moist	ml	0		AP0055 1345 2'		
	2	End of Boring Total Depth = 2.0 ft						
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							

Project: ~~WVOW~~ PBOW

Hole Number: AP3-SB08

HTRW DRILLING LOG

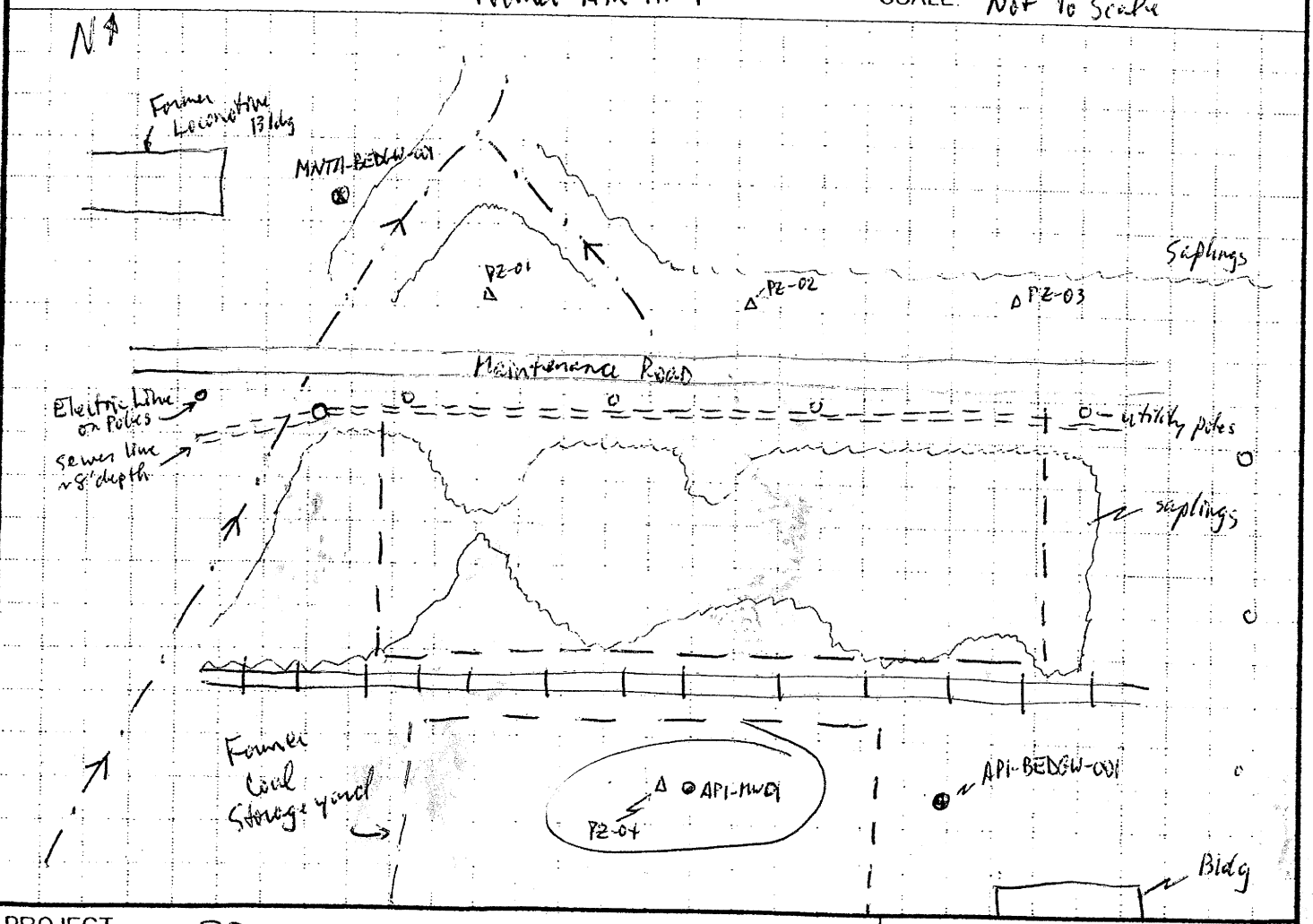
DISTRICT	Nashville, TN
HOLE NUMBER	API-MW01
SHEET / SHEETS	1 OF 3
1 COMPANY NAME	Shaw E+I
2 DRILL SUBCONTRACTOR	AE Drilling
3 PROJECT	PBOW
4 LOCATION	NASA Plum Brook Station, Sandusky, OH
5 NAME OF DRILLER	Kevin Warren
6 MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post hole dug first 5-feet; Drilled w/ 4 1/4" ID/8" OD HSA to 17 ft. Continuously sampled w/ 2ft length, 1.4" ID split-spoons. Set 2" PVC well w/ 10 ft Screen to 16 ft
8 HOLE LOCATION	Ash Pit 1 - See Sketch
9 SURFACE ELEVATION	640.3 ft; Northing: 623372.09; Easting: 1918800.20
10. DATE STARTED	3/15/09
11. DATE COMPLETED	3/15/09
12. OVERBURDEN THICKNESS	unknown
15 DEPTH GROUNDWATER ENCOUNTERED	2.2 ft
13. DEPTH DRILLED INTO ROCK	-0-
16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14 TOTAL DEPTH OF HOLE	17 ft
17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18 GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	NA	NA	David Kessler

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not To Scale



PROJECT PBOW HOLE NO. API-MW01

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-MW01

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		Weeds Coal fragments 0.1	NA		NA	NA	NA	Began Post hole digging first 5 ft 3/14/09
	1	Fill: (2.5Y 5/3) light olive brown, mottled browns (light/dark), SAND little silt, moist)	SP					
	2	wet at 2.2 ft						▽ Encountered gw at 2.2 ft.
	3	3						
		silt content increases w/depth silty SAND	SM					
	4	Loose, (10YR 5/8) yellowish br, mottled (with of dark gray, 5%), vfg, well sorted, ~~wet~~: SAND, wet 5.4	SP		5	3/4/		
	5	Stiff, 2.5Y (2.5/1) black, homogeneous, ~~mottled (with of dark gray)~~, low plasticity, SILT, trace sand, moist 7	ML	0.0	7	7/8 0800	2/2	Began drilling 3/15/09 S-1 Breathing Air/Background VOC = 0.0 ppm LEL = 0% O_2 = 20.8% H_2S = 0 ppm CO = 0 ppm
	7	soft, (2.5Y 5/1) gray, mottled (yellowish brown 10%), low plasticity, clayey SILT, 30% clay, wet	ML	0.0	9	2/2/ 2/3 0815	2/2	S-2
	9	clay content increasing w/depth		0.0		2/2/	2/2	S-3
	10	10						

Project: PBOW | Hole Number: API-MW01

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-MW01

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	Soft. (2.5 y 5/1) gray, mottled (yellowish brown 5-10%), high plasticity, silty CLAY, wet. Consistency increasing w/depth	ch		NA	2/2	2/2	S-3 (cont'd)
					11	0820		
	11			0.0		4/4/4/6	2/2	S-4
	12				13	0825		
	13			0.0		4/4/5/6	2/2	S-5
	14				15	0835		
	15			0.0		4/5/5/7	2/2	S-6
	16							
	17				17	0845		
		Total Depth = 17 ft						
	18							
	19							
	20							

Project: PBOW | Hole Number: API-MW01

Monitoring Well Construction Form

Project:	PBOW	Well Number:	APT-MW01
Location:	NASA Plum Brook Station, Sandusky, OH	Site Location:	Ash Pit 1
Client:	USACE - Nashville, TN	Installation Date	3/15/09
Subcontractor:	AE Drilling	Northing:	623372.09
Driller:	Kevin Warren	Easting:	1918800.20
Shaw Field Representative:	David Kussler	NAD: 83	NGVD: 1929

Protective Cover Elevation (ft): 643.42

Top of Casing Elv. (ft): 642.93

Top of Casing Stickup (ft): 2.50

Land Surface Elv. (ft): 640.3

Approximate Diameter of Borehole (in): 8 1/4"

Well Casing Diameter (in): 2"

Depth to Water (ft):

During Drilling: 2.2 ft

Date: 3/14/09

Post Development: — TOC

Date: —

Top of Bentonite Seal (ft): 3

Top of Filter Pack (ft): 4.5

Top of Screen Interval (ft): 6

Bottom of Screen Interval (ft): 16

Bottom of Well (ft): 16.3

Bottom of Filter Pack (ft): 17 ft

Bottom of Borehole (ft): 17 ft

Protective Casing:

Type: Steel

Dimensions (in): 4"x4"

Length (ft): 5'

Guard Post: 4 Steel

Ground Seal (Surface Pad)

Dimensions: 4'x4'x4"

Type: Concrete

Annular Space Seal

Type: Bentonite-Cement Grout

Installation: (Gravity) Tremie Pumped

Bentonite Seal

Manufacturer: Halliburton - Baroid Industries

Type: Pellets Slurry (Chips)

Installation: 6-in lifts (One Section)

(Gravity) Tremie Pumped

Hydration time (hrs):

* Used ~35 lbs, (large area in sand to fill)

Filter Pack Material

Manufacturer: Global Drilling Supplies, Inc

Product Name: Global Filter Pack

Size: #17

Volume Added (ft³): 7 bags @50lb.

Installation: (Gravity) Tremie

Well Casing

Manufacturer: Campbell - Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Campbell - Monoflex

Type: PVC

Slot Size (in): 0.010 %Open

Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: 0.34

Backfill Material: None

Shaw
Shaw E & I, Inc.

All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.

Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

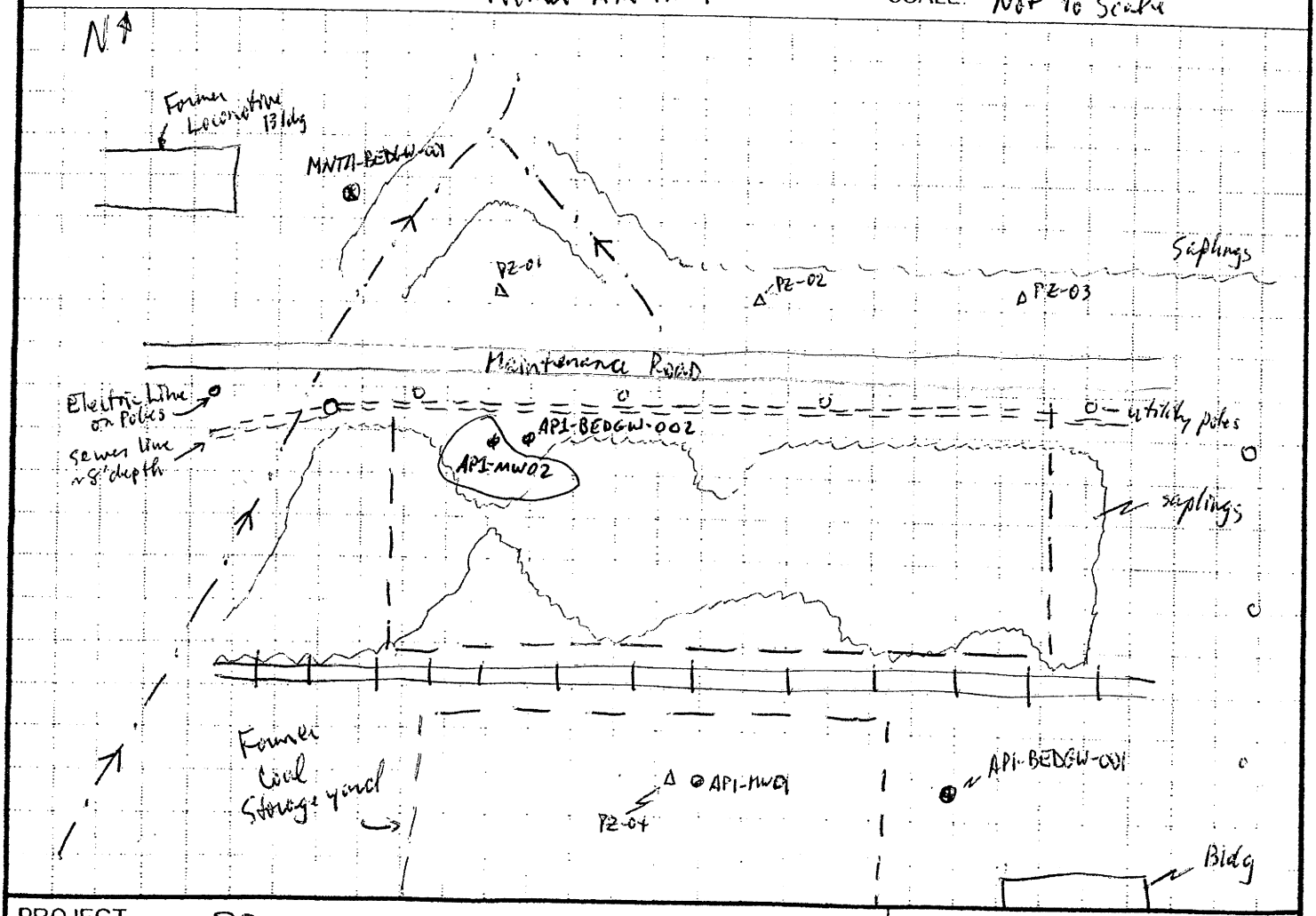
1 COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: AP1-MW02
	2 DRILL SUBCONTRACTOR: AE Drilling	SHEET 1 OF 4 SHEETS
3 PROJECT: PBOW	4 LOCATION: NASA Plum Brook Station, Sandusky, OH	
5 NAME OF DRILLER: ~~Kevin Warren~~ Tom Burnette	6 MANUFACTURER'S DESIGNATION OF DRILL: All Terrain CME-750	
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Post hole dug first 5-feet; Drilled w/ 4 1/4" ID/8" OD HSA to 20.5'	8 HOLE LOCATION: Ash Pit 1 - See Sketch	
	9 SURFACE ELEVATION: 634.7 ft; Northing 623622.45; Easting 1918730.13	
	10 DATE STARTED: 3-18-09	11 DATE COMPLETED: 3-18-09
12 OVERBURDEN THICKNESS: 20.5'	15 DEPTH GROUNDWATER ENCOUNTERED: None (1' surface water)	
13 DEPTH DRILLED INTO ROCK: 0	16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14 TOTAL DEPTH OF HOLE: 20.5'	17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18 GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
	NA	NA	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	N	NA	Eric W. Weaver

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not To Scale



PROJECT	HOLE NO.
PBOW	AP1-MW02

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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-MW02

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 4 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	0	~~Dark bro~~ Black silt, with organics (grass, roots) moist-loose.	ML					Post hole dig to 5' bgs.
	1	▽ Water encountered at 1' bgs. Dark yellowish brown silty clay, medium stiff, wet.	CH					Breathing Space AV O_2 - 21.3 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	2							
	3	See boring Log for: AP1-BEDGW-002 for description of encountered soils.						
	4							
	5							5.0' Begin augering @ 1422
	6							
	7							
	8							
	9							
	10							

Project: PBOW | Hole Number: AP1-MW02

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Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-MW02

Project: PBOW | Geologist: E. Weaver | Sheet 3 of 4 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		See boring log for AP1-BEDGW-002 for description of encountered soils.						Continue augering
	11							
	12							At 12' soil cuttings began to dry up.
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Project: PBOW | Hole Number: AP1-MW02

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-MW02

Project: PBOW

Geologist: E. Weaver

Sheet 4 of 4 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		Auger Refusal @ 20.5'						20.5'
		Boring Complete						
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	0							

Project: PBOW

Hole Number: AP1-MW02

Monitoring Well Construction Form

Project:	PBAW	Well Number:	AP2-MW02
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #1
Client:	USACE - Nashville, TN	Installation Date	3-18-09
Subcontractor:	A.E. Drilling	Northing:	623622.45
Driller:	Tom Burnett	Easting:	1918730.13
Shaw Field Representative:	Eric Weaver	NAD: 83	NGVD: 1929

Shaw Project # 132457

Protective Cover Elevation (ft): 638.45

Top of Casing Elv (ft): 638.01

Top of Casing Stickup (ft): 3.2'

Land Surface Elv. (ft): 634.7

Approximate Diameter of Borehole (in): 8"

Well Casing Diameter (in): 2"

Depth to Water (ft).

During Drilling: ~1' (surface water)

Date: 3-18-09

Post Development — TOC

Date: —

Top of Bentonite Seal (ft): 5.0'

Top of Filter Pack (ft): 7.0'

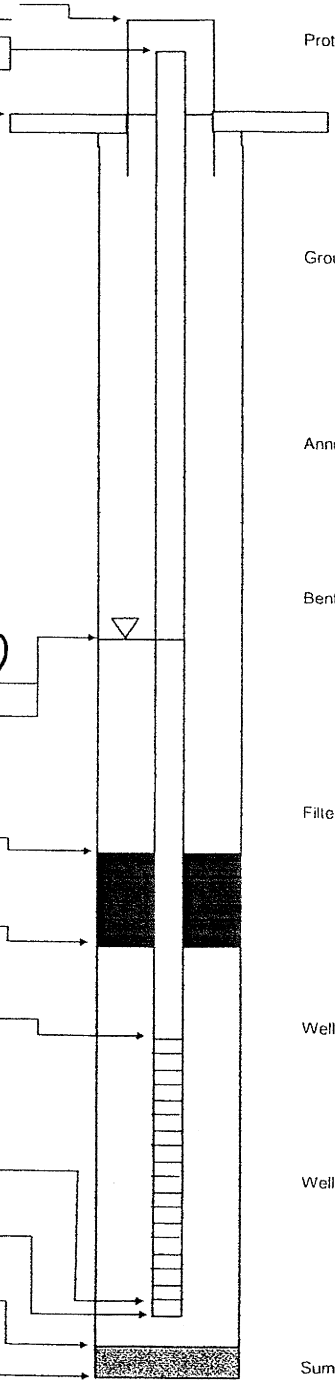
Top of Screen Interval (ft): 9.20'

Bottom of Screen Interval (ft): 19.20'

Bottom of Well (ft): 19.55'

Bottom of Filter Pack (ft): 20.5'

Bottom of Borehole (ft): 20.5'



Protective Casing:

Type: Steel

Dimensions (in): 4"x4"

Length (ft): 5'

Guard Post: 4- concrete filled

Ground Seal (Surface Pad)

Dimensions: 4'x4'x4"

Type: Concrete

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: (Gravity) Tremie Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: Pellets Slurry (chips)

Installation: 6-in lifts (One Section)

(Gravity) Tremie Pumped

Hydration time (hrs): >1 hr.

Filter Pack Material

Manufacturer: Global Drilling Supplies

Product Name: Quartz Filter Pack Sand

Size: #7

Volume Added (ft^3): 3.5 ft^3 (7-bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Slot Size (in): .010 %Open

Slot Type: Continuous wrap (factory slot)

Sump/End Cap: 0.35

Backfill Material: None

Shaw
Shaw E & I, Inc.

All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.

Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

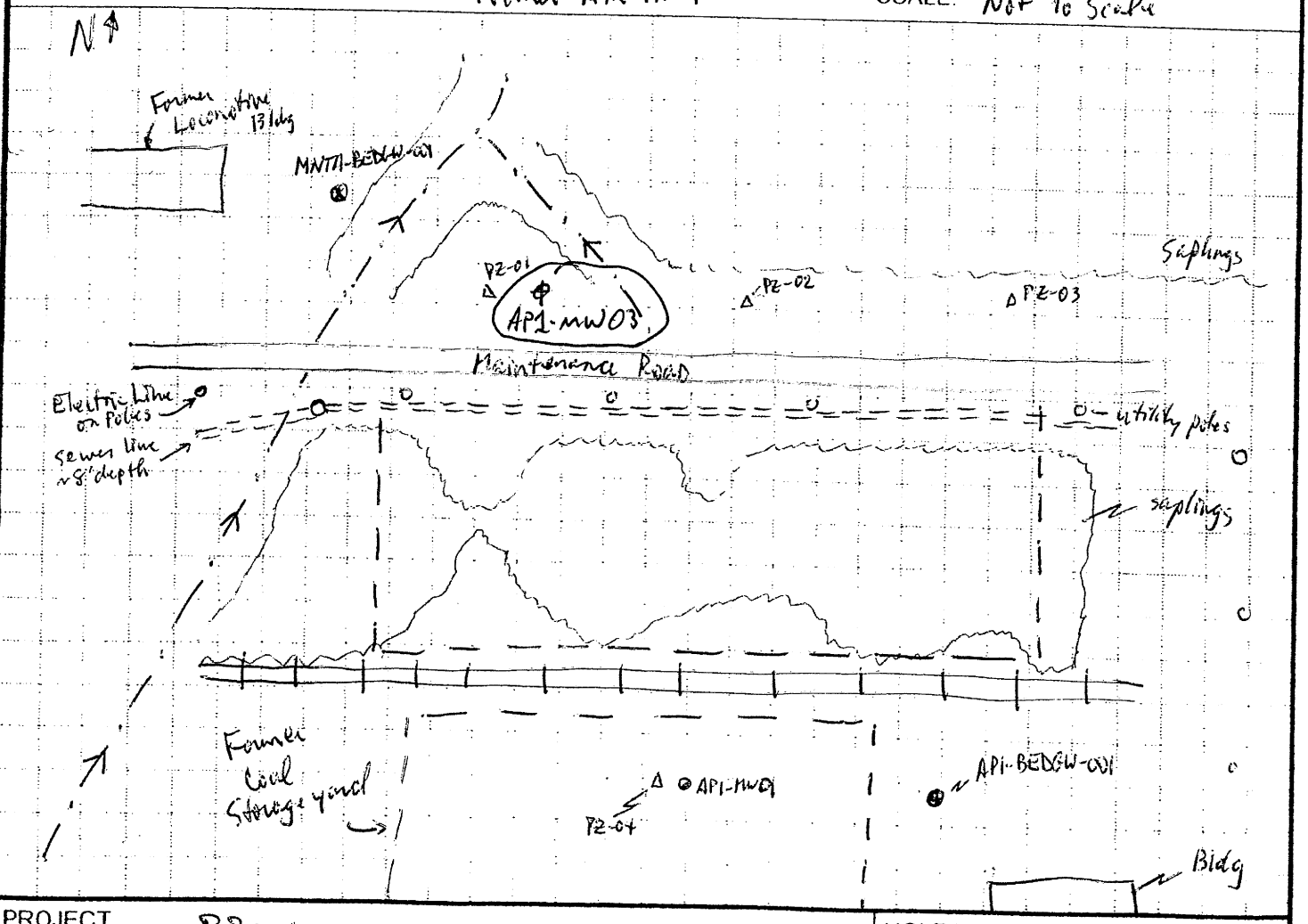
1 COMPANY NAME	Shaw E+I
DISTRICT	Nashville, TN
HOLE NUMBER	AP1-MW03
2 DRILL SUBCONTRACTOR	AE Drilling
SHEET / SHEETS	1 OF 3
3 PROJECT	PBOW
4 LOCATION	NASA Plum Brook Station, Sandusky, OH
5 NAME OF DRILLER	Kevin Warren
6 MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post hole dug first 5-feet; Drilled w/ 4 1/4" ID/8" OD HSA to 20' bgs and split spoon sampler 2"
8 HOLE LOCATION	Ash Pit 1 - See Sketch
9 SURFACE ELEVATION	636.5 ft; Northing: 623723.44; Easting: 1918747.06
10 DATE STARTED	3-31-09
11 DATE COMPLETED	3-31-09
12 OVERBURDEN THICKNESS	Unknown
15 DEPTH GROUNDWATER ENCOUNTERED	No immediate groundwater
13 DEPTH DRILLED INTO ROCK	-0-
16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14 TOTAL DEPTH OF HOLE	20'
17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18 GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
	NA	NA	0

20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21 TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22 DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR
	NA	N	NA	E. W. Weaver

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not To Scale



PROJECT PBOW HOLE NO. AP1-MW03

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-MW03

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 3 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample ~~or Core Box~~ No. Blows	Analytical Sample ~~No.~~ Time	Recovery (ft)	Remarks
	1	Brown (10YR 5/3) silty CLAY, moist, soft.	CL					Post hole dig to 5' bgs. Split spoon driven with 140 lbs. mechanical hammer
	2	Very dark brown (7.5YR 2.5/2) mottled yellowish brown SILT, moist, medium stiff.	ML					
	3							
	4							
	5							Start HS 4 1/4 SS
	5	Dark yellowish brown (10YR 4/6) CLAY, mottled gray, moist, medium stiff, noted roots	CL		4/4	1315	1.0/1.0	
	6				3/4 - 5/5	1317	2.0/2.0	
	7	- intermittent very fine grade sand and silt lenses from 7' to 12'						
	8	- grading towards SILT			2/2 - 4/5	1322	1.2/2.0	
	9							
	0							

Project: PBOW | Hole Number:

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-MW03

Project: PBOW | Geologist: E. Weaver | Sheet 3 of Sheets 3

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	11				5/6 - 7/7	1324	2.0/2.0	
	12	12 Dark gray (10YR 4/1), Silty CLAY, moist, very stiff, shale fragments 5% fine to medium grain	CL		7/10 - 12/10	1326	0.8/2.0	Breathing Space Air O_2-21.2 H_2S-0 CO-0 LEL-0 VOC-0
	13							
	14	- shale fragments increasing to 10% and size to medium to coarse grain.			3/5 - 7/8	1338	1.6/2.0	
	15							
	16	- very fine grain sand lens			6/8 - 12/13	1340	1.6/2.0	
	17							
	18				3/5 - 8/10	1354	1.6/2.0	
	19							
	20	Boring completed @ 20.0'/MW Installed						

Project: PBOW | Hole Number: AP1-MW03

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Monitoring Well Construction Form

Project:	PBAW	Well Number:	AP1-MW03
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #1
Client:	USACE - Nashville, TN	Installation Date	3-31-09
Subcontractor:	A.E. Drilling	Northing:	623723.44
Driller:	Tom Burnett	Easting:	1918747.06
Shaw Field Representative:	Eric Weaver	NAD: 83	NGVD: 1929

Shaw Project #-132457

Protective Cover Elevation (ft): 639.54

Top of Casing Elv (ft): 639.06

Top of Casing Stickup (ft): 2.56

Land Surface Elv. (ft): 636.5

Approximate Diameter of Borehole (in): 8"

Well Casing Diameter (in): 2"

Depth to Water (ft):

During Drilling: No immediate water

Date: 3-31-09

Post Development: — TOC

Date: —

Top of Bentonite Seal (ft): 5.0'

Top of Filter Pack (ft): 7.0'

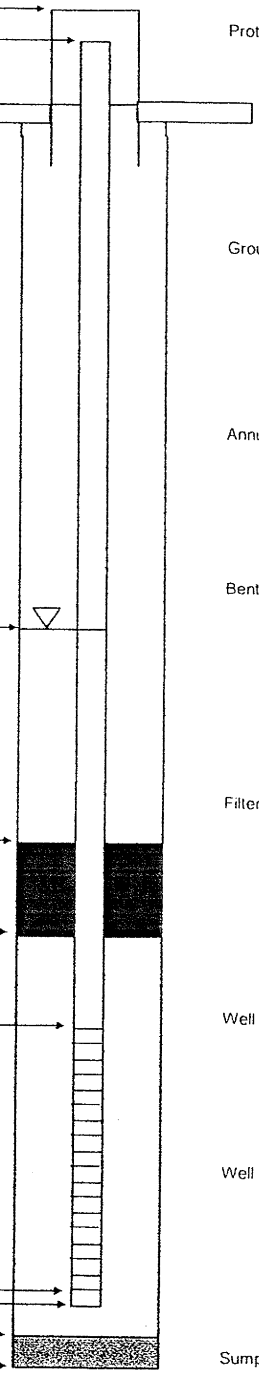
Top of Screen Interval (ft): 9.0'

Bottom of Screen Interval (ft): 19.0'

Bottom of Well (ft): 19.35'

Bottom of Filter Pack (ft): 20.0'

Bottom of Borehole (ft): 20.0'



Protective Casing:

Type: Steel

Dimensions (in): 4" x 4"

Length (ft): 5'

Guard Post: 4- concrete filled

Ground Seal (Surface Pad)

Dimensions: 4' x 4' x 4"

Type: Concrete

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: (Gravity) Tremie Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: Pellets Slurry (chips)

Installation: 6-in lifts (One Section)

(Gravity) Tremie Pumped

Hydration time (hrs): >1 hr

Filter Pack Material:

Manufacturer: Global Drilling Suppliers

Product Name: Quartz Filter Pack Sand

Size: #7

Volume Added (ft^3): 3 ft^3 (6-bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Slot Size (in): .010 %Open

Slot Type: Continuous wrap (Factory slot)

Sump/End Cap: 0.35

Backfill Material: None

Shaw
Shaw E & I, Inc.

All elevations are referenced to the Ohio State Plane (North Zone) NAD 83 and vertical datum NGVD 1929.

Depths and heights are referenced to ground surface unless specified TOC.

HTRW DRILLING LOG

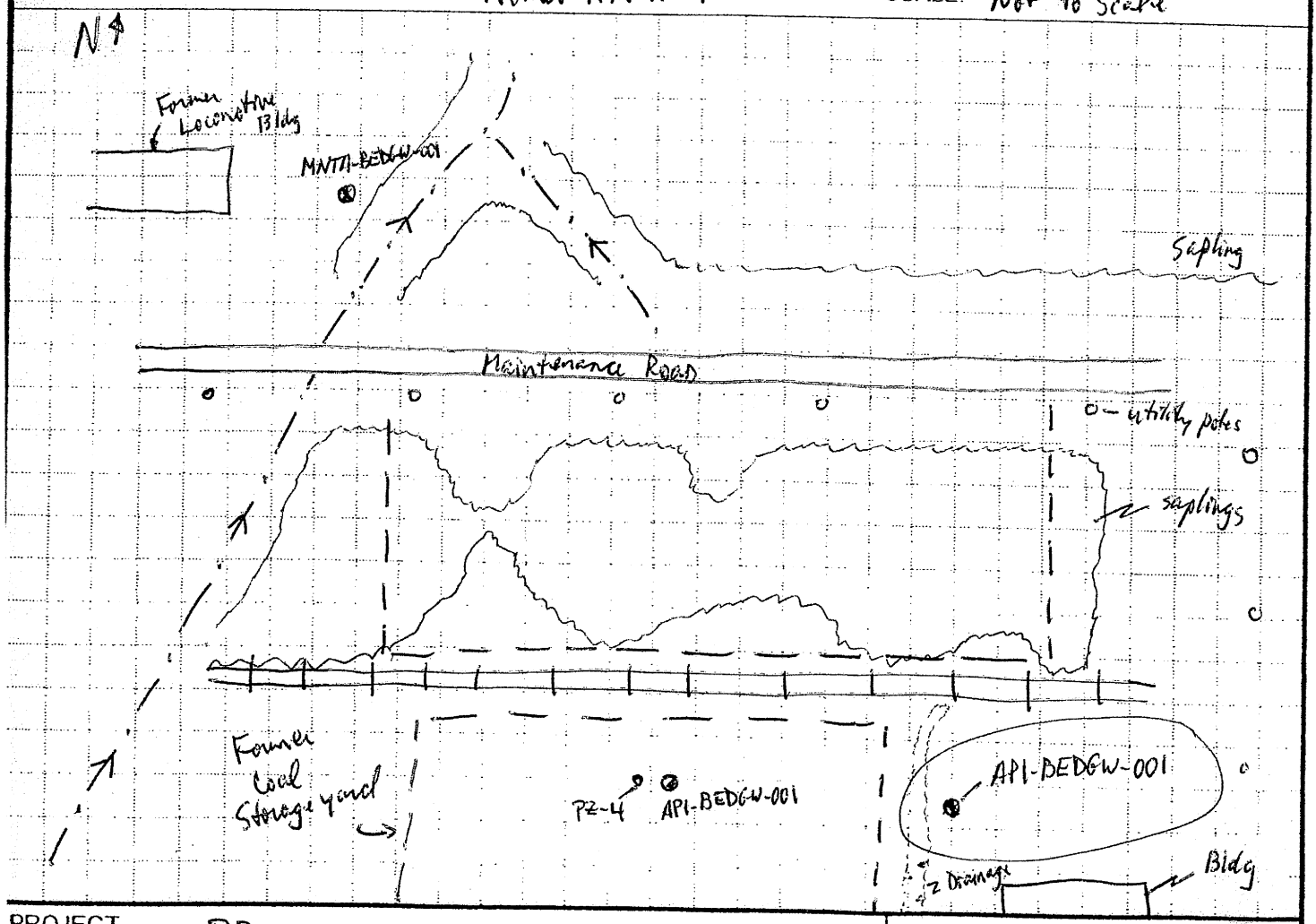
1. COMPANY NAME: Shaw E+I	DISTRICT: Nashville, TN	HOLE NUMBER: API-BEDGW-001
3. PROJECT: PBOW	2. DRILL SUBCONTRACTOR: AE Drilling	SHEET 1 OF 10 SHEETS
5. NAME OF DRILLER: Kevin Warren / Tom Burnett	4. LOCATION: NASA Plum Brook Station, Sandusky, OH	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Post hole dug first 5-feet. Drilled w/ 4 1/4" ID/8" OD HSA to 26 Ft. Overdrilled w/ 8"/4" / 12" OD HSA to 24 Ft. 6" OD rotary bit drilled to 44.9 Ft. Set 6" ID/6 5/8" OD black steel casing to 44.8 Ft. Cored rock w/ 6" PQ 6.7 to 81.3'	6. MANUFACTURER'S DESIGNATION OF DRILL: All Terraine CME-75V	
	8. HOLE LOCATION: Ash Pit 1 - see sketch	
	9. SURFACE ELEVATION: 641.8 ft; Northing: 623369.01; Easting: 1918892.38	
	10. DATE STARTED: 3/13/09	11. DATE COMPLETED: 3/18/09
12. OVERBURDEN THICKNESS: 25.5 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: 1.5 ft overburden / ~68 bedrock	
13. DEPTH DRILLED INTO ROCK: 55.8'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 81.3'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	4

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	NA	NA	NA	NA	NA	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	NA	2" PVC	NA	David Kessler / Eric W. Weaver

LOCATION SKETCH/COMMENTS: Former Ash Pit 1 SCALE: Not To Scale



PROJECT	HOLE NO.
PBOW	API-BEDGW-001

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		Grass						
		Fill: (Loose, 2.5Y(2.5/1) black, silty SAND, 45% silt, gravel, concrete fragments, organics (roots), moist) 0.7	Sm	NA	NA	NA	NA	Began Post-hole 3/13/09 0830
	1	Fill: ((10YR 3/2) very dark grayish brown, sandy SILT, 40% sand, low plasticity, rock, concrete fragments, wet)	ml					Fill material native soil placed + relocated due to demolition of Power House 1
	2							▽ Encountered surface water at 1.5 ft
	3							Background/Breathing Air: VOCs = 0.0 ppm, LEL = 0%, H_2S = 0 ppm, CO = 0 ppm, O_2 = 20.8 ppm
	4							
	5	5.5			5			
	6	Stiff, (10YR 5/1), gray, mottled (black, brown), clayey SILT, little sand 20%, rock fragments (shale, ln), wet	ml	0.0		3/5/7/3	1/2	Began Drilling w/ 4¼" HSA 3/13/09 1045 S-1
	7	Loose, (10YR 2/2) very dark brown, mottled (shades of brown, black, gray), very fine grain, well sorted, SAND, little silt (20%)	Sm		7	1045		
	8	Color change at 8.9 ft to (10YR 4/1) dark gray, mottled (brown) silt content increasing to 30% wet		0.4		3/4/3/3	2/2	S-2
	9				9	1050		
	10			0.1		2/3/	1.6/	S-3

Project: PBOW | Hole Number: API-BEDGW-001

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	Loose, (10YR 4/1) dark gray, mottled (brown/tan) 20%, very fine grain, well sorted, SAND, silt 30%, wet	Sm	0.1	NA	2/2	1/2	S-3 (cont)
	11			NM		1055 2/2/3/3	1.2/2	S-4 NM - Not measured PID malfunction (CAL Bulb - cal now)
	12	12.9						
	13	Stiff, (10YR 4/1) dark gray, mottled (brown, light tan) high plasticity, silty CLAY, moist silt lenses periodic (0.01ft)	ch	NM		1100 4/5/7/7	2/2	S-5
	14							
	15			NM		1115 4/5/4/7	2/2	S-6
	16	silt content increasing						
	17	color variations between 10YR 4/1 (dark gray) and (10YR 4/2 very dark gray, shale fragments present, rounded, pebble size to very coarse grain, wet	ch	NM		1125 8/11/12/12	2/2	S-7
	18							
	19			NM		1135 5/7/	2/	S-8
	20							

Project: PBOW | Hole Number: API-BEDGW-001

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Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 4 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	20	Stiff, (10YR 4/1) dark gray, homogeneous, ~~low to no~~ high plasticity, silty CLAY, 40% silt, shale fragments, very coarse grain to pebble size, rounded, silt lenses, dry		NM	NA	17/7	1/2	S-8 (cont)
	21		Ch	NM	21	1310 6/8 10/10	0/2	S-9
	22							
	23	shale fragments increase w/ depth 15%		NM	23	1315 6/6 8/9	2/2	S-10
	24							8"ID/12"OD HSA cut to 24 ft
	25			NM	25	1325 16/50 over 5"	0.9/0.9	S-11
		25.5						4 1/4" HSA Refusal @ 26 ft
	26	SHALE, highly weathered, thinly laminated, gray, dry	NA	NA	25.9	1335 NA	NA	Began drilling w/ 8" OD rotary bit (wet) 3/14/09 0855
	27							
	28							
	29							
	30							

Project: PBOW | Hole Number: API-BEDGW-001

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 5 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~	Recovery (ft)	Remarks
	30	SHALE, highly weathered, gray colored discharge water	NA	NA	NA	NA	NA	
	31							Background/Breathing Air: VOCs = 0.0 ppm; LEL = 0%; O_2 = 20.8%; CO = 0.0 ppm; H_2S = 0 ppm
	32							
	33							Unable to tell any lithology while cutting with 8" rotary. Drilling similar to mud drilling only using only water. Consistency of rock based upon drilling speed, pressure applied, and bouncing ~~of~~ of bit/rods while drilling.
	34							
	35							
	36							
	37							
	38							
	39							
	40							

Project: PBOW | Hole Number: API-BEDGW-001

Shaw
Shaw E & I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler/[illegible] | Sheet 6 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample~~ ~~or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
	40	SHALE, gray						
	41							
	42							
	43							
	44							6" Casing set at 44.8 ft 8" OD Rotary Bit cut to 44.9 ft.
		44.6						
	45	LIMESTONE, dark gray, massive bedding, fossiliferous (brachs, corals) highly fractured, hard, slightly weathered			45.1' Box #1		44.9	3-17-09
	46					46.1 mechanical 46.4 46.5	~~[illegible]~~ Break	C-1 (45.1-46.3) Run - 1.1 Rec - 1.0 Tagged bottom @ 46.3 ~~Start - 1454~~ End - 1456
	47					47.1 47.7		C-2 (46.3-51.3) Run - 5.0 Rec - 5.2 ~~Start~~ - 1506 End - 1509 Breathing Space Air O_2 - 20.8 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	48							
	49							
	50					50.0 - Mechanical Break		

Project: PBOW | Hole Number: API-BEDGW-001

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-001

Project: PBOW | Geologist: D. Kessler | Sheet 7 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
	50	LIMESTONE, dark gray, fossiliferous (bracks, corals), highly fractured, hard, slightly weathered			Box #1 Cont			
	51					50.9		
						51.3 - Mechanical Break		C-3 (51.3 - 56.3) Run - 5.0 Rec - 5.0 Start - 1521 End - 1525
	52							
	53					52.8		
						53.8		
	54					54.0		
						54.5		
	55				54.9 Box #2	54.9		
		- grading to light gray						
	56							
		- Pyrite nuggets				56.3		
						56.4		C-4 (56.3-61.3) Run - 5.0 Rec - 5.0 Start - 1637 End - 1642
	57							
		- ~~oil~~ Petroleum hydrocarbon seeping out of rock from 57.5 - 60.4				57.5		
	58							
						58.4		
	59							
						59.6		
	60							

Project: PBOW | Hole Number: API-BEDGW-001

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 8 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
		LIMESTONE, light gray, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.			Box #2	60.6		
	61					61.3		61.3
	62	- Petroleum hydrocarbon seeping out of rock from 62.0-64.3'				62.2		C-5 (61.3-66.3) Run - 5.0 Rec - ~~1652~~ 5.0 Start - 1652 End - 1657 Breathing Space Air O_2 - 20.8 H_2S - 0 CO - 0 LEL - 0 VOC - 0
	63							
	64							
				64.6	Box #3			
	65	- Coral Reef <0.1 thick, Petroleum Hydrocarbon seepage				65.6		
	66							C-6 (66.3-71.3) Run - 5.0 Rec - 5.0 Start - 1715 End - 1720
	67	- Suspect water bearing fracture				67.4		
	68	- Suspect water bearing fracture				68.0		
	69					69.0		
	70							

Project: PBOW

Hole Number: API-BEDGW-001

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-BEDGW-001

Project: PBOW | Geologist: E. Weaver | Sheet 9 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech Sample or Core Box No.	Analytical Sample No. Breaks	Recovery (ft)	Remarks
		LIMESTONE, light gray, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.			Box #3	70.3		
						70.8		
	71							Start 3-18-09 71.3
								C-7 (71.3-76.3)
								Run - 5.0'
	72							Rec - 5.0'
						72.3		Start - 0838
		- Coral bed - 72.5-73.6				72.5		End - 0841
								O_2 - 20.8
	73					73.0		H_2S - 0
					Box #4			CO - 0
								LEL - 0
								VOC - 0
	74	- Possible water bearing fracture				74.0		
		- Possible water bearing fracture				74.2		
	75					74.9		
		- Possible water bearing fractures				75.6		
						75.7		
	76							
						76.3 - Mechanical Break		
								C-8 (76.3-81.3')
						76.8		Run - 5.0'
	77							Rec - 5.0'
								Start - 0852
								End - 0858
	78							
	79							
						79.3		
	80							

Project: PBOW | Hole Number: AP1-BEDGW-001

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: AP1-BEDGW-001

Project: PBOW | Geologist: E. Weaver | Sheet 10 of 10 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Frac's	Recovery (ft)	Remarks
					Box # 4 Cont.			
	81					81.3-Mechanical Break		81.3
		Boring Completed Monitor Well Set @ 79.35' Total Depth = 81.3 Ft (Borehole)						
	82							
	83							
	84							
	85							
	86							
	87							
	88							
	89							
	90							

Project: PBOW | Hole Number: AP1-BEDGW-001

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Monitoring Well Construction Form (Bedrock)

Project:	PBOW	Well Number:	AP2-BEDGW-001
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #1
Client:	USACE-Nashville, TN	Installation Date	3-18-09
Subcontractor:	A.E. Drilling	Northing:	623369.01
Driller:	Kevin Warren / Tom Burnett	Easting:	1918892.38
Shaw Field Representative:	David Ressler / Eric Weaver	Shaw Project Number:	132457

Protective Cover Elevation (ft): 644.62

Top of Casing Elevation (ft): 644.28

Top of Casing Stickup (ft): 2.70

Land Surface Elevation (ft): 641.8

Approximate Diameter of Section 1 Borehole (in): 12" to 24' / 8" to 44.9'

Diameter of Surface Casing (in): 6 5/8" OD / 6" ID

Depth to Bedrock (ft): 25.5'

Bottom of Surface Casing (ft): 44.8'

Depth to Water (ft):

During Drilling: ~68'

Date: 3-17-09

Post Development: — TOC

Date: —

Approximate Diameter of Section 2 Borehole (in): 6"

Well Casing Diameter (in): 2"

Top of Bentonite Seal (ft): 59.0'

Top of Filter Pack (ft): 62.0'

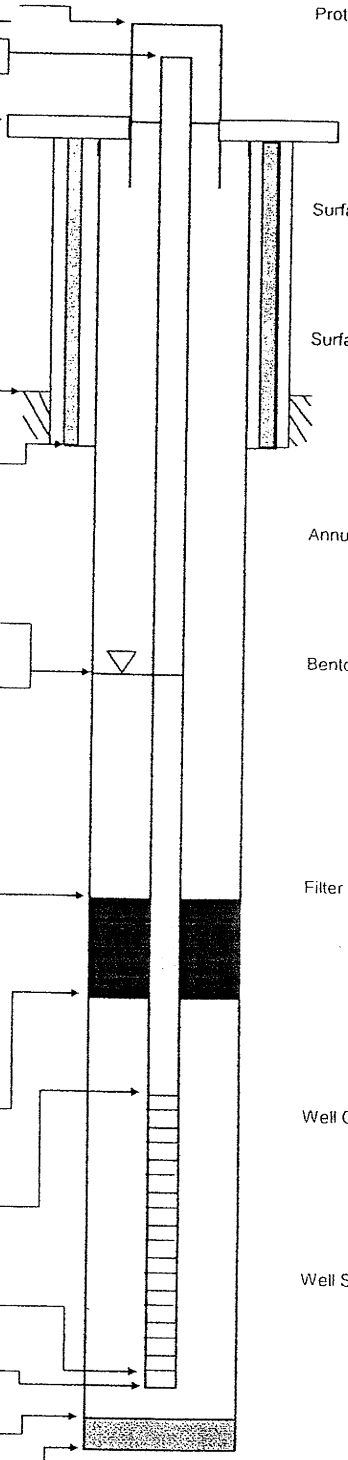
Top of Screen Interval (ft): 64.0'

Bottom of Screen Interval (ft): 79.0'

Bottom of Well (ft): 79.35

Bottom of Filter Pack (ft): 81.3'

Bottom of Borehole (ft): 81.3'



Protective Casing:

Type: Steel

Dimensions (in): 4"x4"

Length (ft): 5'

Guard Post: 4-concrete filled

Surface Pad:

Dimensions: 4'x4'x4"

Type: Concrete

Surface Casing:

Type: Black Steel

Diameter (in): 6 5/8" OD / 6" ID

Installation: Tremie Haliburton Cementing Plug ~~Other Plug~~ Johnson Grout shoe

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: Gravity (Tremie) Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: (Pellets) Slurry

Installation: 6-in lifts (One Section) Gravity (Tremie) Pumped

Hydration time (hrs): >1 hr.

Filter Pack Material:

Manufacturer: Global Drilling Suppliers

Product Name: Quartz Filter Pack Sand

Size: #7

Volume Added (ft^3): 2.75 ft^3 (5.5-bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Johnson

Type: PVC

Slot Size (in): .010 %Open

Slot Type: (Continuous wrap) Factory slot

Sump/End Cap: 0.35'

Backfill Material: None

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Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).

HTRW DRILLING LOG

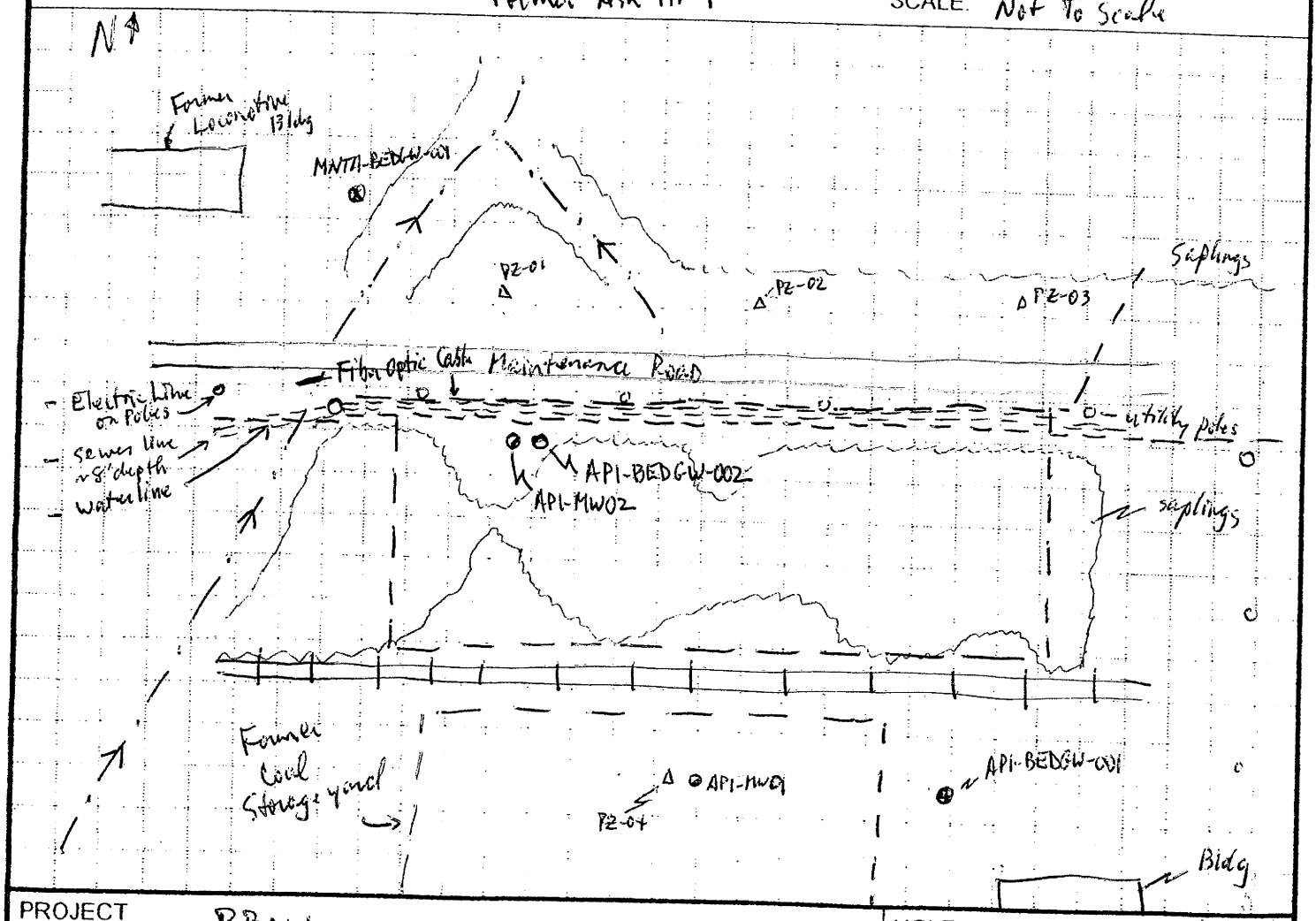
DISTRICT	Nashville, TN
HOLE NUMBER	API-BEDGW-002
SHEET / OF SHEETS	1 / 8
1 COMPANY NAME	Shaw E+I
2 DRILL SUBCONTRACTOR	AE Drilling
3 PROJECT	PBOW
4 LOCATION	NASA Plum Brook Station, Sandusky, OH
5 NAME OF DRILLER	Kevin Warren / Tom Burnett
6 MANUFACTURER'S DESIGNATION OF DRILL	All Terrain CME-750
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Post hole dug first 5-feet. Drilled w/ 4¼" ID/8¼" OD HSA to 22 ft w/ continuously 2 ft length, @ 1.4" ID split-spoon sampling. Overdrilled borehole w/ 8¼" ID/ 12" OD HSA to 19.5 ft, Bedrock cut wet w/ 8" OD rotary bit. Rock cored with 6" PQ 6.7 to 61.3' bgs.
8 HOLE LOCATION	Ash Pit 1 - See Sketch
9 SURFACE ELEVATION	634.5 ft; Northing: 623620.90; Easting: 1918741.22
10 DATE STARTED	8/15/09
11 DATE COMPLETED	3/29/09
12 OVERBURDEN THICKNESS	21.4 ft
15 DEPTH GROUNDWATER ENCOUNTERED	Surface water ~1 ft / 51.3' bedrock
13 DEPTH DRILLED INTO ROCK	39.9
16 DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14 TOTAL DEPTH OF HOLE	61.3
17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18 GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
	NA	NA	3

20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21 TOTAL CORE RECOVERY
	NA	NA	NA	NA	NA	%

22 DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR
	NA	N	NA	David Kessler / S. W. Weaver

LOCATION SKETCH/COMMENTS Former Ash Pit 1 SCALE: Not To Scale



PROJECT PBOW HOLE NO. API-BEDGW-002

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 2 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
		Grass			NA	NA	NA	Post-hole dug first 5 ft
	1							▽ Groundwater (surface water) encountered 1 ft
	2	Fill: (Medium stiff, (10YR 3/4) dark yellowish brown, high plasticity, silty CLAY, wet)	ch	0.0				Breathing Air/Background VOCs = 0.0 ppm LEL = 0% H_2S = 0 ppm CO = 0 ppm O_2 = 20.8 %
	3							
	4	4						(Blows) split-spoon driven by 140 lb mechanical hammer.
	5	Medium stiff, (10YR 4/3) brown, mottled (brownish yellow-silt, gray-clay), (40%), low plasticity, clayey SILT	ml	NM	5	2/3/4/5	2/2	S-1 Began drilling 3/15/09 1305
	6							Received message from indicator that H_2S "missing". Unit not operating.
	7				7	1305 3/3/4/6	2/2	S-2
	8	8 Medium stiff (2.5Y 4/1) dark gray, homogeneous, high plasticity, silty CLAY, moist (silt 35%), shale fragments, very coarse grain (5%)	ch	NM				
	9				9	1315 2/2/	1.5/	S-3
	10							

Project: PBOW | Hole Number: API-BEDGW-002

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 3 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	10	Medium Stiff, (2.5y 4/1) dark gray, homogeneous, high plasticity, silty CLAY, silt as high as 45%, moist limestone pebble 11.5 ft	ch	NM	NA	3/4	1/2	S-3 (cont)
	11					1325		11 S-4
				NM		3/6/ 6/7	2/2	Large rock encountered 12.2 ft
	12	silt content variable 10-45%						
						1340		13 S-5
	13	shale fragments very coarse grain to pebble size, subrounded to rounded.		NM		3/8/ 8/9	2/2	
	14	Consistency increasing w/ depth color grading (value ~~inc~~ decreasing)						
						1415		15 S-6
	15	At 15 ft; color (2.5y 3/1) very dark gray	ch	NM		6/8/ 9/11	2/2	
	16							
						1430		17 S-7
	17			NM		5/7/ 12/14	2/ 2	
	18							
						1435		19
	19					7/10/	2/	S-8 12" OD HSA drilled to 19.5 ft
	20							

Project: PBOW | Hole Number: API-BEDGW-002

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Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 4 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	~~Analytical Sample No.~~ Blows	Recovery (ft)	Remarks
	20	Very stiff, (2.5Y 3/1) very dark gray, homogeneous, high plasticity, silty CLAY, shale fragments (15%), moist	ch	NM	NA	13/20	/2	S-8 (cont)
	21	21.4			21	1445		S-9
		SHALE, highly weathered, thinly laminated, friable, dark gray,		NM		31/ 50 over 3"	0.7/ 0.7	
	22				21.8	1500		4 1/4" ID HSA refusal @22 ft.
	23	competent (harder) shale or limestone encountered 22.5-23'						Began drilling w/ 8" OD rotary bit. 3/16/09 (wet)
	24							
	25							
	26							
	27							
	28							
	29							
	30							

Project PBOW | Hole Number: API-BEDGW-002

Shaw
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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW | Geologist: D. Kessler | Sheet 5 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	Geotech. Sample or Core Box No.	Analytical Sample No.	Recovery (ft)	Remarks
	30	SHALE, weathered, thinly laminated, gray	NA	NM	NA	NA	NA	Drilling w/8"OD Rotary bit. (wet)
	31							
	32							Intermittent hard zones of rock. Either shale or lm layers.
	33							
	34							
	35							
	36							
	37							
	38							6"ID Casing set to 40.0 ft
	39							Drilled w/8"OD Rotary Bit to 40.0 ft
		39.5 Limestone, hard, competent						Begin 3-25-09
	40							

Project: PBOW | Hole Number: API-BEDGW-002

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C-1
Rev
Rel
Start 0940
Finish 0942

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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 6 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Frac	Recovery (ft)	Remarks
	41	LIMESTONE, dark gray, massive bedding, fossiliferous (brachs, corals), highly fractured, hard, slightly weathered.			Box #1	40.1 40.7 41.2 41.5		C-1 (40.0-41.3) Run - 1.3 Rec - 0.7 Start 0940 End 0942
	42							C-2 (41.3-46.3) Run - 5.0 Rec - 5.3 Start - 0953 End - 0958
	43					43.1		
	44							
	45	- intensly fractured, possible water bearing fracture.				44.9 45.0		
	46					46.0 46.1		46.3
	47	- Intense fracturing possible water bearing fracture. - possible water bearing fracture				46.6 47.0 47.6		C-3 (46.3-51.3) Run - 5.0 Rec - 5.3 Start - 1006 End - 1012
	48	- Pyrite - grading to light gray - Possible water bearing fractures.				48.6 48.7		
	49				49.0 Box #2	49.0		
	50							

Project: PBOW

Hole Number: API-BEDGW-002

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BEDGW-002

Project: PBOW

Geologist: B. Weaver

Sheet 7 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core~~ Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
	50	LIMESTONE, light gray, massive bedding, fossiliferous (bracks, corals) highly fractured, hard, slightly weathered.			Box #2 Cont.	50.5		
	51					51.3 - Mechanical Break		51.3
								C-4 (51.3-56.3)
						51.7		Run 5.0
	52							Rec - 5.0
								Start - 1119
								End - 1123
						52.8		
	53							
						53.8 - ~~Mechanical Break~~		
	54							
	55					55.2 - Mechanical Break		
								~~Start~~
								~~C-4 (51.3-56.3)~~
						55.9 - Mechanical Break		~~Run 5.0~~
	56							~~Rec~~
						56.3 Mechanical break		56.3
								~~Start - 1121~~
								~~End~~
	57							C-5 (56.3-61.3)
								Run 5.0
					57.5	57.5		Rec - 5.0
					Box #3			Start - 1131
	58							End - 1136
	59							
	60					59.9		

Project: PBOW

Hole Number: API-BEDGW-002

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HTRW DRILLING LOG (continuation sheet)

Hole Number: API-BODGW-002

Project: PBOW

Geologist: E. Weaver

Sheet 8 of 8 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or~~ Core Box No.	~~Analytical Sample No.~~ Fracs	Recovery (ft)	Remarks
	61	LIMESTONE, light gray, massive bedding, fossiliferous (brachs, corals) highly fractured, hard, slightly weathered.			Box #3 Cont. 61.3	-60.9		61.3
	62	Boring Completed. Monitor Well Installed Total Depth = 61.3 ft						
	63							
	64							
	65							
	66							
	67							
	68							
	69							
	70							

Project: PBOW

Hole Number: API-BODGW-002

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Monitoring Well Construction Form (Bedrock)

Project:	PBOW	Well Number:	AP1-BEPGW-002
Location:	NASA Plum Brook Station, Sandusky, Ohio	Site Location:	Ash Pit #1
Client:	USACE - Nashville, TN	Installation Date	3-25-09
Subcontractor:	A.E. Drilling	Northing:	623620.90
Driller:	Kevin Warner / Tom Burnett	Easting:	1918741.22
Shaw Field Representative:	David Kessler / Eric Weaver	Shaw Project Number:	132457

Protective Cover Elevation (ft): 637.52

Top of Casing Elevation (ft): 637.16

Top of Casing Stickup (ft): 2.82

Land Surface Elevation (ft): 634.5

Approximate Diameter of Section 1 Borehole (in): 12" to 19.5'
8" to 40'

Diameter of Surface Casing (in): 6 5/8" OD / 6" ID

Depth to Bedrock (ft): 21.4'

Bottom of Surface Casing (ft): 40'

Used 7 @ 94 lbs bags Portland Type I/II cement/bentonite mixture to seal casing.

Depth to Water (ft):

During Drilling: ~51.3'

Date: 3-25-09

Post Development: — TOC

Date: —

Approximate Diameter of Section 2 Borehole (in): 6"

Well Casing Diameter (in): 2"

Top of Bentonite Seal (ft): 39.0'

Top of Filter Pack (ft): 42.0'

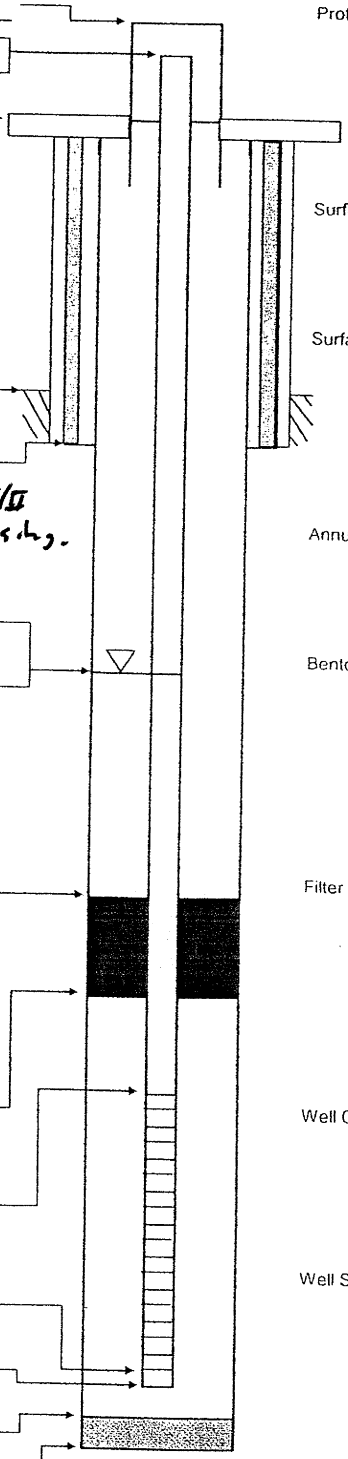
Top of Screen Interval (ft): 44.0'

Bottom of Screen Interval (ft): 59.0'

Bottom of Well (ft): 59.35'

Bottom of Filter Pack (ft): 61.3'

Bottom of Borehole (ft): 61.3'



Protective Casing:

Type: Steel

Dimensions (in): 4" x 4"

Length (ft): 5'

Guard Post: 4 - concrete filled

Surface Pad:

Dimensions: 4' x 4' x 4"

Type: Concrete

Surface Casing:

Type: Black Steel

Diameter (in): 6 5/8" OD / 6" ID

Installation: Tremie Haliburton

Cementing Plug ~~Other Plug~~ Johnson Grout shoe

Annular Space Seal:

Type: Bentonite-Cement Grout

Installation: Gravity (Tremie) Pumped

Bentonite Seal:

Manufacturer: Haliburton

Type: (Pellets) Slurry

Installation: 6-in lifts (One Section)

Gravity (Tremie) Pumped

Hydration time (hrs): > 1 hr.

Filter Pack Material:

Manufacturer: Global Drilling Suppliers

Product Name: Quartz Filter Pack Sand

Size: #7

Volume Added (ft^3): 3 ft^3 (6 - bags)

Installation: Gravity (Tremie)

Well Casing:

Manufacturer: Campbell Monoflex

Type: PVC

Diameter (in): 2"

Well Screen Casing:

Manufacturer: Johnson

Type: PVC

Slot Size (in): .010 %Open

Slot Type: (Continuous wrap) Factory slot

Sump/End Cap: 0.35'

Backfill Material: None

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Depths and heights are referenced to ground surface unless specified TOC.
All elevations are referenced to MSL (NAVD 88).

APPENDIX B

DIRECT-PUSH SOIL BORING, DIRECT-PUSH GROUNDWATER, SURFACE WATER, SEDIMENT, AND GROUNDWATER SAMPLE COLLECTION LOGS

Shaw™
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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: ASH PIT 1-SB01
Sample Number: AP0001
Sample Name: PBOW-08-SS-ASH PIT 1-SB01-AP0001-(0-1)
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Geoprobe, 5' Acetate Sleeves, Disposable zip-lock baggies

Task: 132288
Collection Date: 12-8-08
Collection Time: 1125
Start Depth: 0'
End Depth: 1'
Sample Matrix: SOIL
Sample Team: Ressler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

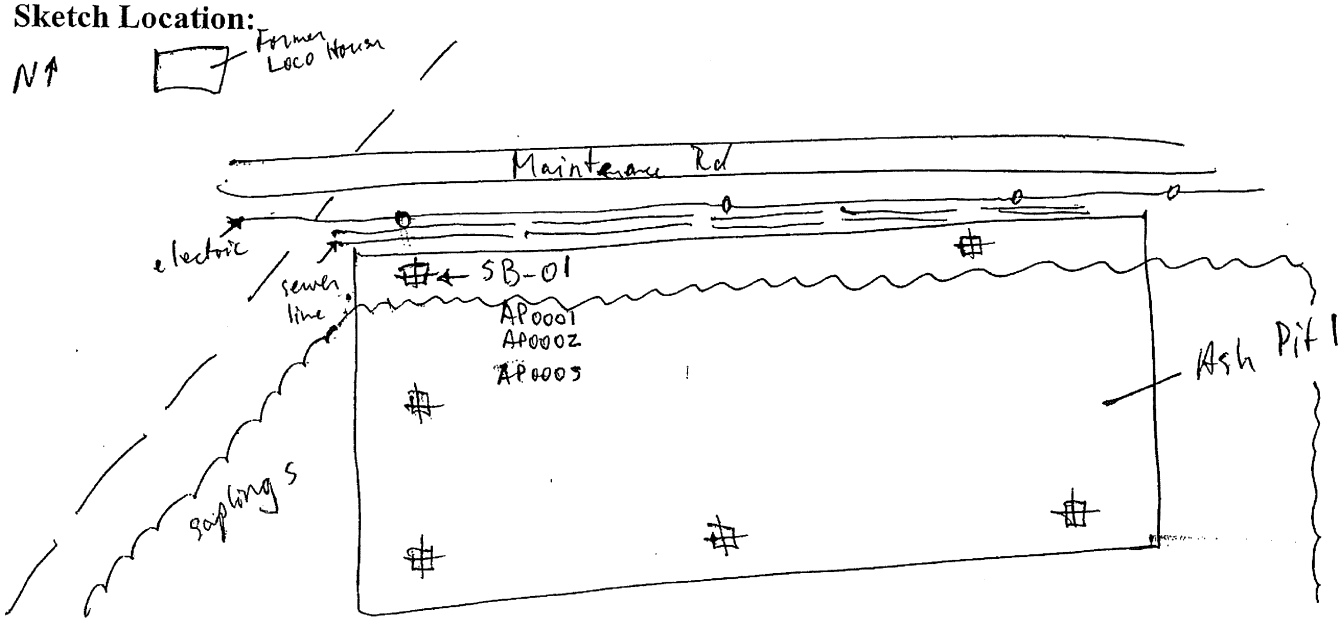
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM
TOC-B	N	B	1	2	oz	CWM

Comments: 0 to 1' below 0.5' feet of fill material
Actual 0.5' to 1.5' TOC collected here.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-8-08 *Reviewed BY / Date:* Edward E. Weaver 1-20-0

Shaw™
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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AM2

Location Code: **ASH PIT 1-SB01**
Sample Number: **AP0002**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB01-AP0002-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: See AP0001 Reg

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1128
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 3' to 5' sample collect below 0.5' of fill material
Actual 3.5' to 5.5'

Sketch Location:

See AP0001 Reg

Logged BY / Date: E.W. Weaver 12-8-08 *Reviewed BY / Date:* Edward A. Weaver 1-20-0

Shaw™
Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: ASH PIT 1-SB01
Sample Number: AP0003
Sample Name: PBOW-08-DS-ASH PIT 1-SB01-AP0003-(8-1(
Sampling Method: DP
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: 132288
Collection Date: 12-8-08
Collection Time: 1130
Start Depth: 8'
End Depth: 10'
Sample Matrix: SOIL
Sample Team: Kessler/Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 8' to 10' Sample collected at 8' to 10' below current ground surface

Sketch Location:

See AP0001 Reg

Logged BY / Date: E W Weaver 12-8-08 *Reviewed BY / Date:* Edward W Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS
Manager: Steve Downey

RFA / COC Number: PB120908ANL

Location Code: **ASH PIT 1-SB02**
Sample Number: **AP0004**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB02-AP0004-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5 ft Acetate Sleeves, Disposable zip-locks

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1230
Start Depth: 0'
End Depth: 1'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

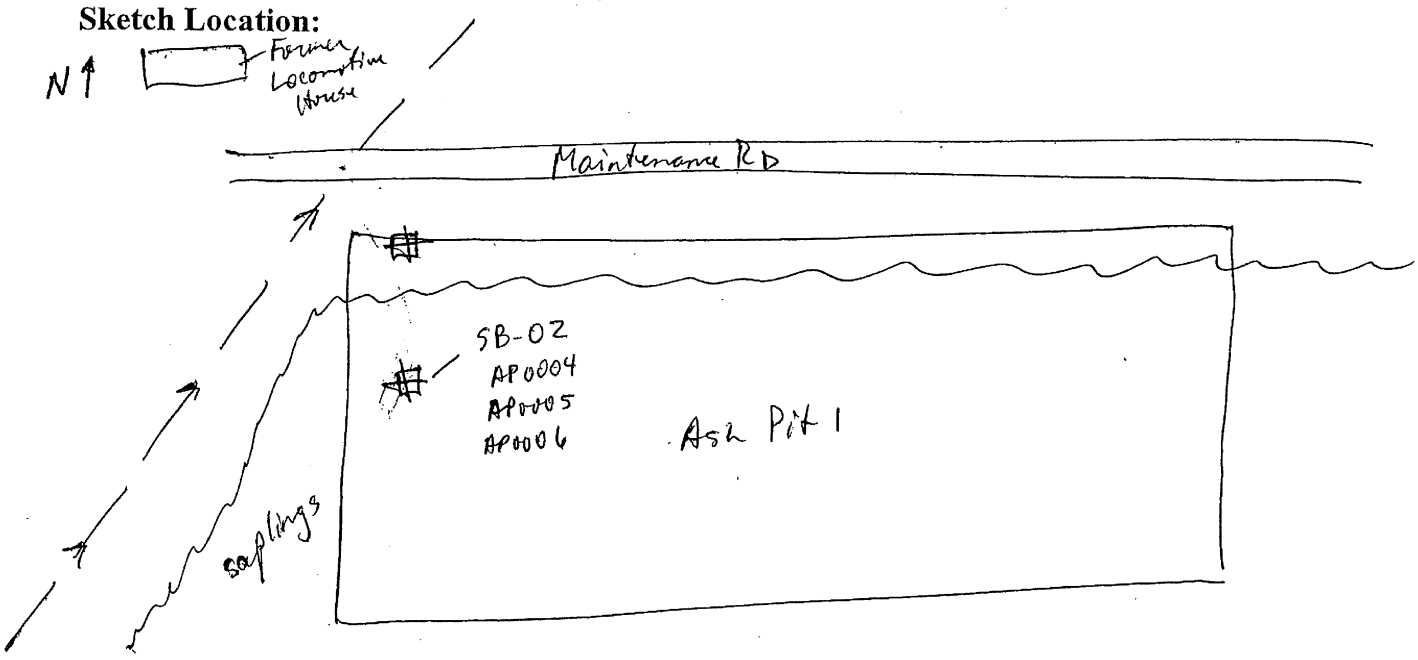
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 0 to 1' collected from 0 to 1'

Sketch Location:



Logged BY / Date: Eric W. Weaver 12-8-08 *Reviewed BY / Date:* Edward J. Weaver 1-20-

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: **ASH PIT 1-SB02**
Sample Number: **AP0005**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB02-AP0005-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1333
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Sample collected @ 3' to 5' BGS
OK 3-3-8
Actual ~~3' to 3.8'~~ BGS

Sketch Location: ~~5' to 8' BGS~~ GW

see AP0004 Reg

Logged BY / Date: E. W. Weaver 12-8-08 *Reviewed BY / Date:* Edward L. Weaver 1-20-

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: **ASH PIT 1-SB02**
Sample Number: **AP0006**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB02-AP0006-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1335
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kooler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 8' to 10' sample collected 8' to 10' BGS

Sketch Location:

See AP0004 Reg

Logged BY / Date: E. W. Weaver 12-8-08 *Reviewed BY / Date:* Edward E. Weaver 1-20

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008 AML

Location Code: **ASH PIT 1-SB03**

Sample Number: **AP0007**

Sample Name: **PBOW-08-SS-ASH PIT 1-SB03-AP0007-(0-1)**

Sampling Method: **HA**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5ft Acetate Sleeves, Disposable zip-lock baggies

QC Partners:

(TB) — (ER) — (FB) —

Task: **132288**

Collection Date: 12-9-08

Collection Time: 1350

Start Depth: 0'

End Depth: 1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

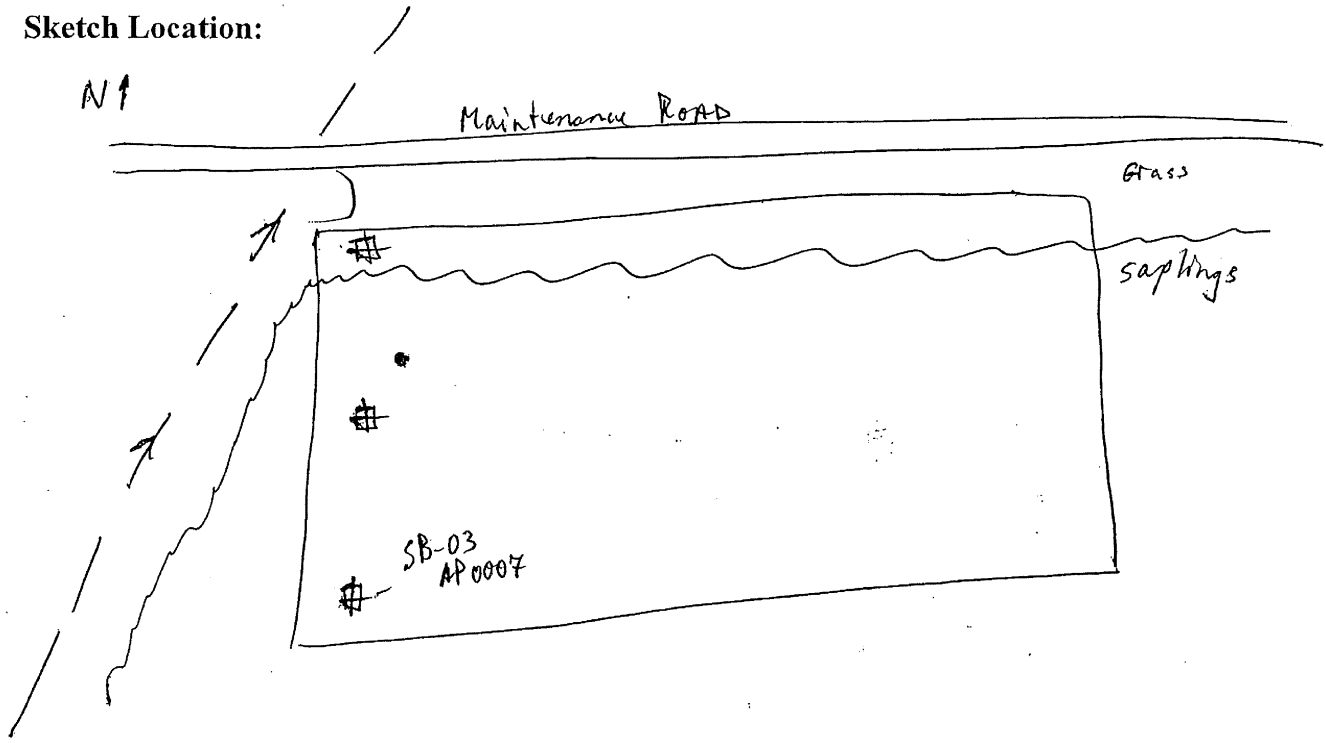
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 0 to 1' Collected

Sketch Location:



Logged BY / Date: E. W. Weaver 12-9-08 *Reviewed BY / Date:* Edward E. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB03**

Sample Number: **AP0008**

Sample Name: **PBOW-08-DS-ASH PIT 1-SB03-AP0008-(3-5)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: —

QC Partners:

(TB) — (ER) — (FB) —

Task: **132288**

Collection Date: 12-9-08

Collection Time: 1352

Start Depth: 3'

End Depth: 5'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

ERPIMS Values:

Sacode:

Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Collected

Sketch Location:

See AP0007 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward E. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB03**
Sample Number: **AP0009**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB03-AP0009-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1355
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 8' to 10' Collected

Sketch Location:

See AP0007 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edwards & Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB04**

Task: **132288**

Sample Number: **AP0010**

Collection Date: 12-9-08

Sample Name: **PBOW-08-SS-ASH PIT 1-SB04-AP0010-(0-1)**

Collection Time: 0910

Sampling Method: **HA**

Start Depth: 0'

Sample Type: **SS** *Sample Purpose:* **REG**

End Depth: 1'

Sampling Equip: Geoprobe, 5' Acetate Sleeves, Disposable ziplock baggies

Sample Matrix: **SOIL**

QC Partners:

(TB) — **(ER)** — **(FB)** —

Sample Team: Kessler/Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:

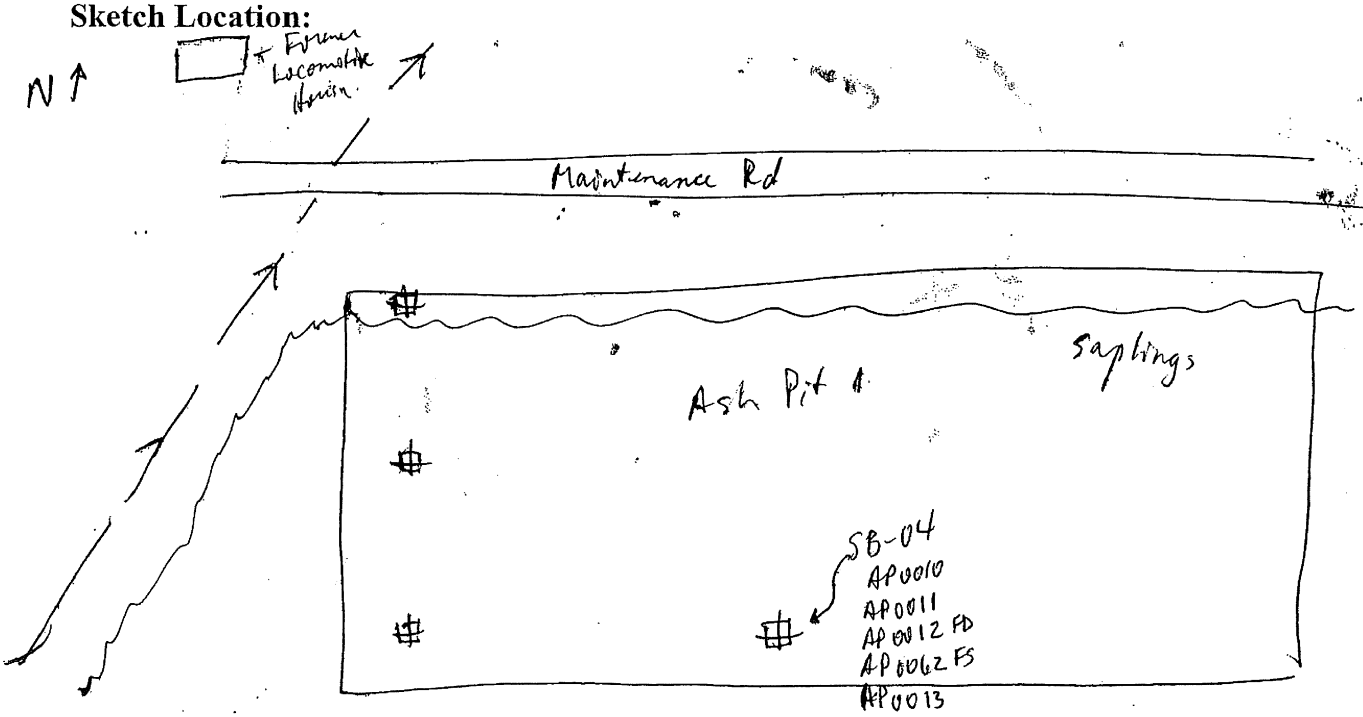
Sacode:

Lot Control#:

Comments: 0 to 1' Collected @ 0 to 1'

Actual 0 to 1'

Sketch Location:



Logged BY / Date: E. W. Weaver

Reviewed BY / Date: Edward S. Weaver 1-20-

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB04**
Sample Number: **AP0011**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB04-AP0011-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 0912
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Sample collected @ 3' to 5'
Actual 3' to 4'

Sketch Location:

See AP0010 Reg.

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward x Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AMLTA

Location Code: **ASH PIT 1-SB04**
Sample Number: **AP0012**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB04-AP0012-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **FD**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 0912
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 3' to 5' Sample collected at 3' to 5'
Actual 3' to 4'

Sketch Location:

See AP0010 Reg

Logged BY / Date: L. W. Weaver 12-9-08 *Reviewed BY / Date:* Edward E. Weaver 1-20-

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML-TA

Location Code: **ASH PIT 1-SB04**

Sample Number: **AP0062**

Sample Name: **PBOW-08-DS-ASH PIT 1-SB04-AP0062-(~~8-16~~ 3-5 BW)**

Sampling Method: **DP**

Sample Type: **DS** *Sample Purpose:* **FS**

Sampling Equip: —

QC Partners:

(TB) — (ER) — (FB) —

Task: **132288**

Collection Date: 12-9-08

Collection Time: 0912

Start Depth: 3'

End Depth: 5'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	4	oz	CWM
METALS	N	B	2	4	oz	CWM
SEMIVOLATILES	N	C	2	4	oz	CWM

ERPIMS Values:

Sacode:

Lot Control#:

Comments: 3' to 5' sample collected @ 3' to 5'

Actual 3' to 4'

Sketch Location:

See AP0010 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward G. Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS
Manager: Steve Downey

RFA / COC Number: PB121008AU2

Location Code: **ASH PIT 1-SB04**
Sample Number: **AP0013**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB04-AP0013-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 0915
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Sample collected at 8' to 10'

Sketch Location:

See AP0010 Reg

Logged BY / Date: L. Wheaver 12-9-08

Reviewed BY / Date: Edward K. Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: P12 10 08AML

Location Code: **ASH PIT 1-SB05**

Sample Number: **AP0014**

Sample Name: **PBOW-08-SS-ASH PIT 1-SB05-AP0014-(0-1)**

Sampling Method: **HA**

Sample Type: **SS** *Sample Purpose:* **REG**

Sampling Equip: Geoprobe, 5' Acetate Sleeves, Disposable Zip-lock baggies

Task: **132288**

Collection Date: 12-9-08

Collection Time: 0835

Start Depth: 0'

End Depth: 1'

Sample Matrix: **SOIL**

Sample Team: Kessler/Weaver

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

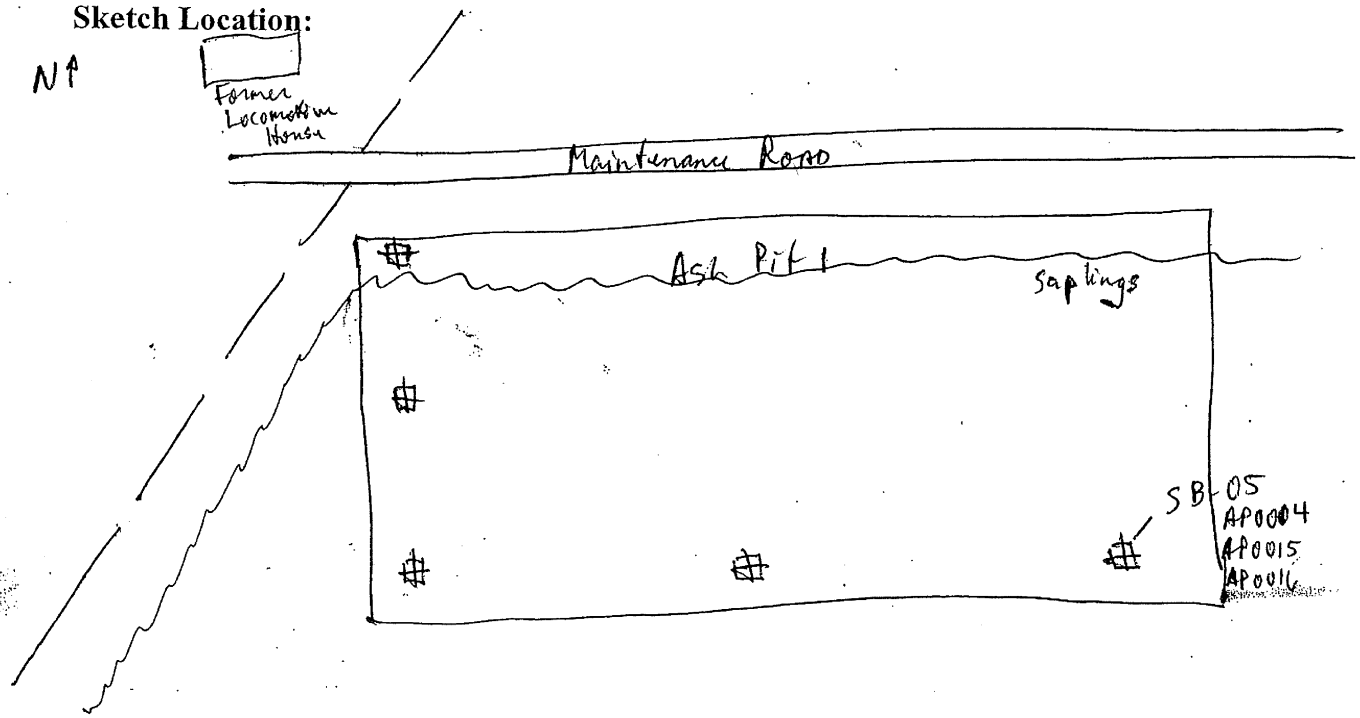
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 0 to 1' Sample collected

Sketch Location:



Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward S. Weaver 1-20-0[illegible]

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB12100% AML

Location Code: **ASH PIT 1-SB05**
Sample Number: **AP0015**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB05-AP0015-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 0837
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 3' to 5' sample collected
Actual 3' to 3.7'

Sketch Location:

See AP0014 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward X Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB05**
Sample Number: **AP0016**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB05-AP0016-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 0840
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler Weaver

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 8' to 10' Sample collected at 8' to 9' BGS

Sketch Location:

See AP0014 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward E. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908 AML

Location Code: **ASH PIT 1-SB06**
Sample Number: **AP0017**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB06-AP0017-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5 Ft Acetate Sleeves, Disposable zip-lock baggies

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1550
Start Depth: 0'
End Depth: 6'
Sample Matrix: **SOIL**

QC Partners:
(TB) — (ER) — (FB) —

Sample Team: Kessler / Weaver

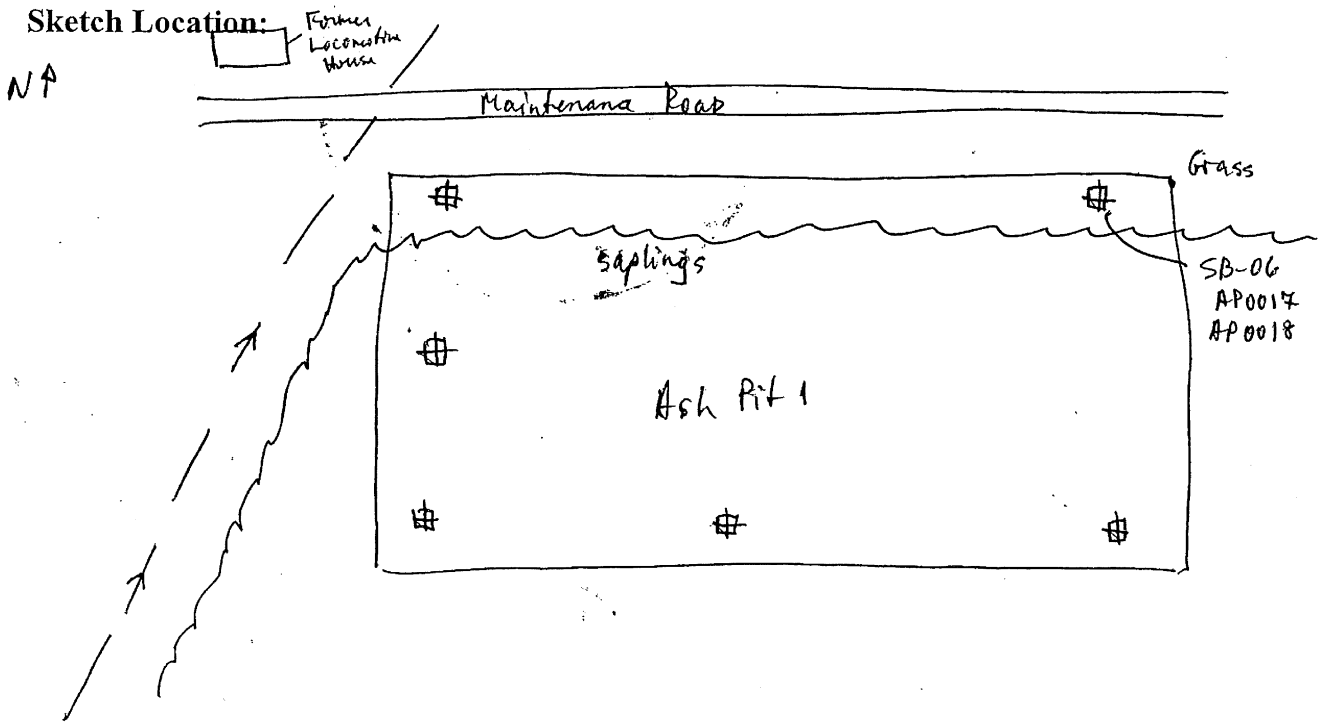
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0 to 1' Sample collected below 0.8' of fill material
Actual 0.8' to 1.8'

Sketch Location:



Logged BY / Date: E. W. Weaver 12-8-08 *Reviewed BY / Date:* Edward K. Weaver 1-20-0

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Shaw E & I, Inc.

Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: **ASH PIT 1-SB06**
Sample Number: **AP0018**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB06-AP0018-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1553
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Sample collected below 0.8' of fill material
Actual 5' to 5.8'

Sketch Location:

See AP0017 Reg

Logged BY / Date: E. Weaver 12-8-08

Reviewed BY / Date: Edward C. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB120908AML

Location Code: **ASH PIT 1-SB06**
Sample Number: **AP0019**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB06-AP0019-(8-1(**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

Task: **132288**
Collection Date: 12-8-08
Collection Time: 1554
Start Depth: 8'
End Depth: 10'
Sample Matrix: **SOIL**
Sample Team: Kessler / Weaver

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:

See AP0017 Reg

Logged BY / Date: E. W. Weaver 12-8-08 *Reviewed BY / Date:* Edward K. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB08**
Sample Number: **AP0023**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB08-AP0023-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: Geoprobe, 5 Ft Acetate Liners, Disposable zip-lock bags

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1050
Start Depth: 0'
End Depth: 1'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

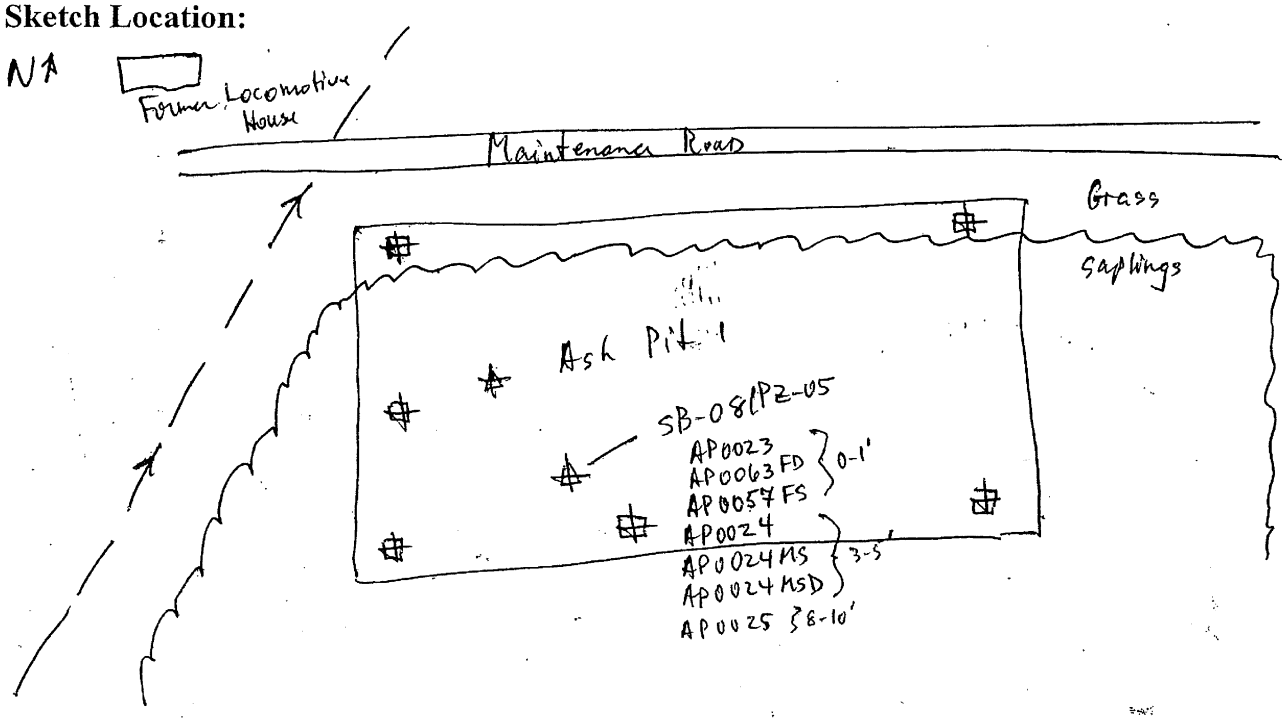
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 0 to 1' collected

PD, FS

Sketch Location:

NA



Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward K. Weaver 1-20-0

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008 AML

Location Code: **ASH PIT 1-SB08**
Sample Number: **AP0063**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB08-AP0063(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **FD**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1050
Start Depth: 0'
End Depth: 1'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 0 to 1' Collected

Sketch Location:

See AP0023 Reg

Logged BY / Date: E W Weaver 12-9-08 *Reviewed BY / Date:* Edwards/Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB08**
Sample Number: **AP0024**
Sample Name: **PBOW-08-DS-ASH PIT 1-SB08-AP0024-(3-5)**
Sampling Method: **DP**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1055
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler/Weaver

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 3' to 5' collected

MS + MSD

Sketch Location:

See AP0023 Reg

Logged BY / Date: 12-9-08 *Reviewed BY / Date:* 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB12100: AMC

Location Code: **ASH PIT 1-SB08**
Sample Number: **AP0024MS**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB08-AP0024MS-(3**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **MS**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1055
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler / Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Collected

Sketch Location:

See AP0023 Reg

Logged BY / Date: E. W. Weaver 12-9-08 *Reviewed BY / Date:* Edward S. Kessler 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121008AML

Location Code: **ASH PIT 1-SB08**
Sample Number: **AP0024MSD**
Sample Name: **PBOW-08-SS-ASH PIT 1-SB08-AP0024MSD-**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **MSD**
Sampling Equip: —

QC Partners:
(TB) — (ER) — (FB) —

Task: **132288**
Collection Date: 12-9-08
Collection Time: 1055
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: Kessler / Weaver

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	8	oz	CWM
METALS	N	A	1	8	oz	CWM
PCB3	N	A	1	8	oz	CWM
SEMIVOLATILES	N	A	1	8	oz	CWM

Comments: 3' to 5' Collected

Sketch Location:

see AP0023 Reg

Logged BY / Date: E. W. Weaver 12-9-08

Reviewed BY / Date: Edward J. Weaver 1-20-0

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082009ACCT

Location Code: ASH PIT 3-SB01

Sample Number: AP0032

Sample Name: PBOW-08-SS-ASH PIT 3-SB01-AP0032-(0-1)

Sampling Method: HA

Sample Type: SS *Sample Purpose:* REG

Sampling Equip: 5.5" hand auger

QC Partners:

(TB) No (ER) No (FB) No

Task: 132288 CPT

Collection Date: TBE 8/19/09

Collection Time: 1355

Start Depth: 0.0'

End Depth: 1.0

Sample Matrix: SOIL

Sample Team: Brian Tiell, C. Strzepka

ERPIMS Values:

Sacode:

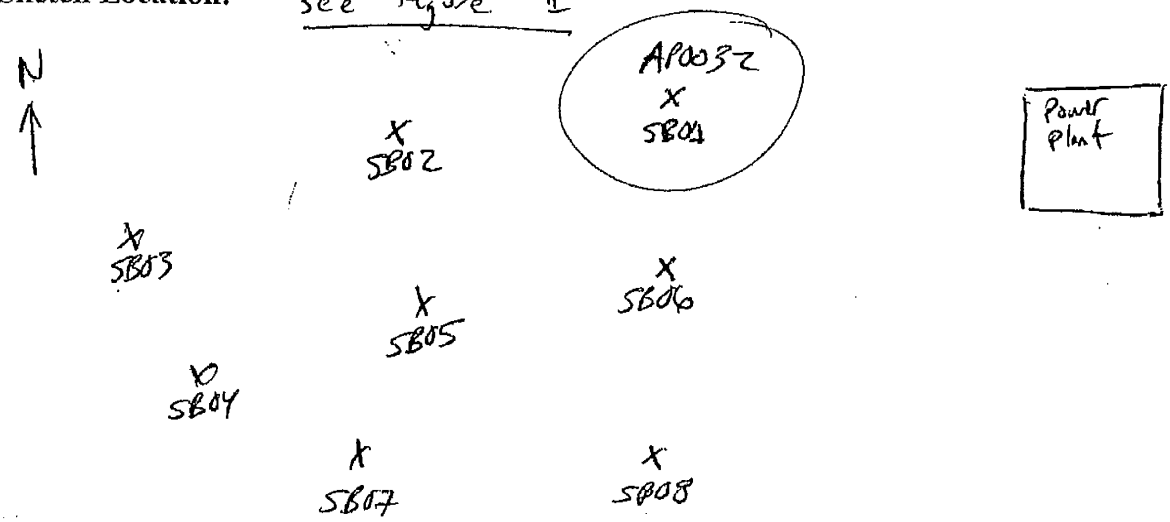
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM
TOC-B	N	B	1	4	oz	CWM

Comments: mixture of fine sand, organic layer,

Sketch Location: see figure 1



Logged BY / Date: 8/19/09

Reviewed BY / Date: 5/11/20

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082009ACCT

Location Code: **ASH PIT 3-SB01**
Sample Number: **AP0033**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB01-AP0033-(3-5)**
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: S.S. hand auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: 1425
Start Depth: 3.0'
End Depth: 5.0'
Sample Matrix: **SOIL**
Sample Team: B. Tiel & C. Strzeyn

QC Partners:
(TB) No (ER) No (FB) No

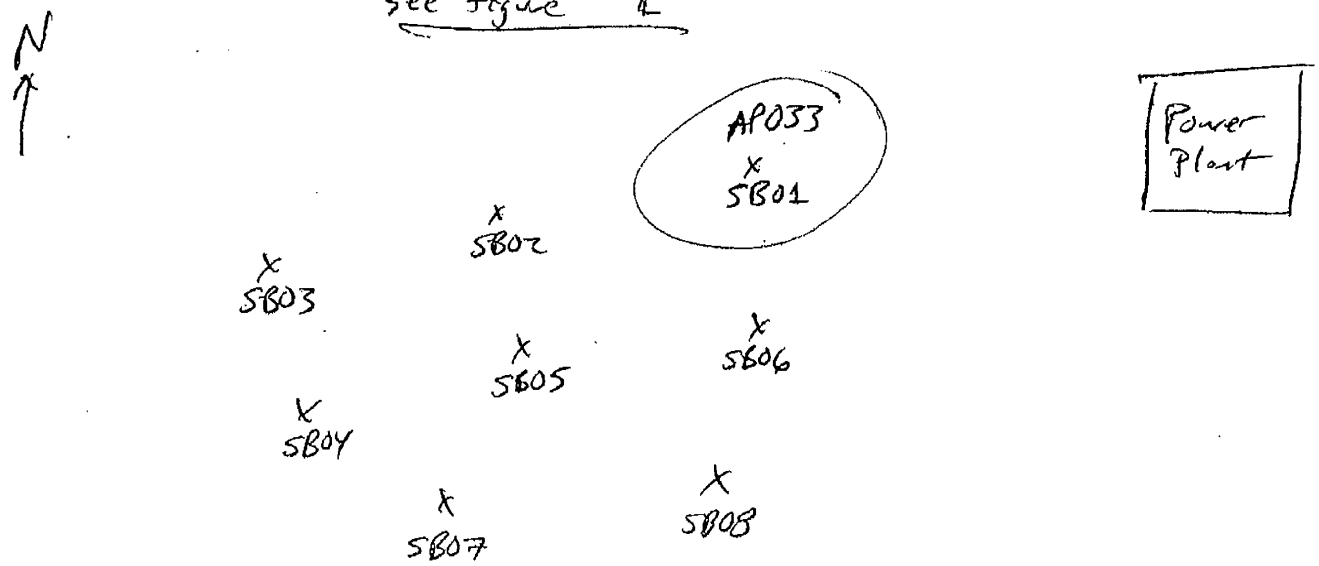
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Brown & gray fine sand and silt to clayey silt to silty clay

Sketch Location: see figure 1



Logged BY / Date: 8/19/09

Reviewed BY / Date: Edward [illegible] 5/11/2010

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Sample Collection Log

132457 · PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082009ACCT

Location Code: **ASH PIT 3-SB02**
Sample Number: **AP0036**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB02-AP0036-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: 1540
Start Depth: 0.0
End Depth: 1.0
Sample Matrix: **SOIL**
Sample Team: B. Tiell, C. Stroyda

QC Partners:
(TB) N (ER) N (FB) N

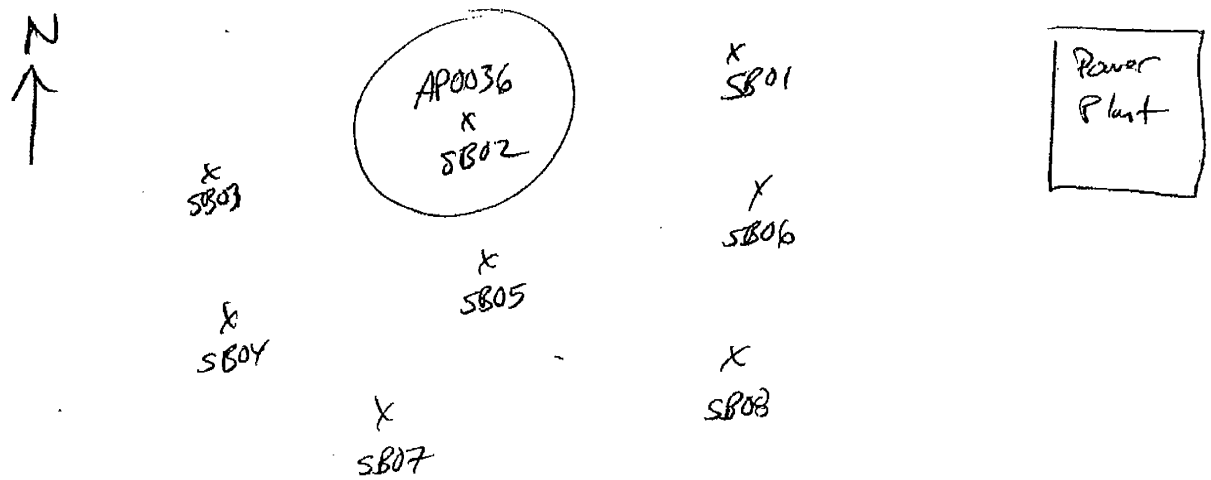
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: clayey fine sand, brown & gray, no odor, moist

Sketch Location: see figure 1



Logged BY / Date: C. S. 8/19/09 *Reviewed BY / Date:* Edward Hoover 5/11/2010

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082009ACCT

Location Code: **ASH PIT 3-SB02**
Sample Number: **AP0037**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB02-AP0037-(~~3-5~~)** 1.2-2.25
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: 1550
Start Depth: ~~2.25~~ ~~ft~~ 1.2
End Depth: ~~3.0~~ ~~ft~~ 2.25
Sample Matrix: **SOIL**
Sample Team: B Tiel, C. Strzegyka

QC Partners:
(TB) N (ER) N (FB) N

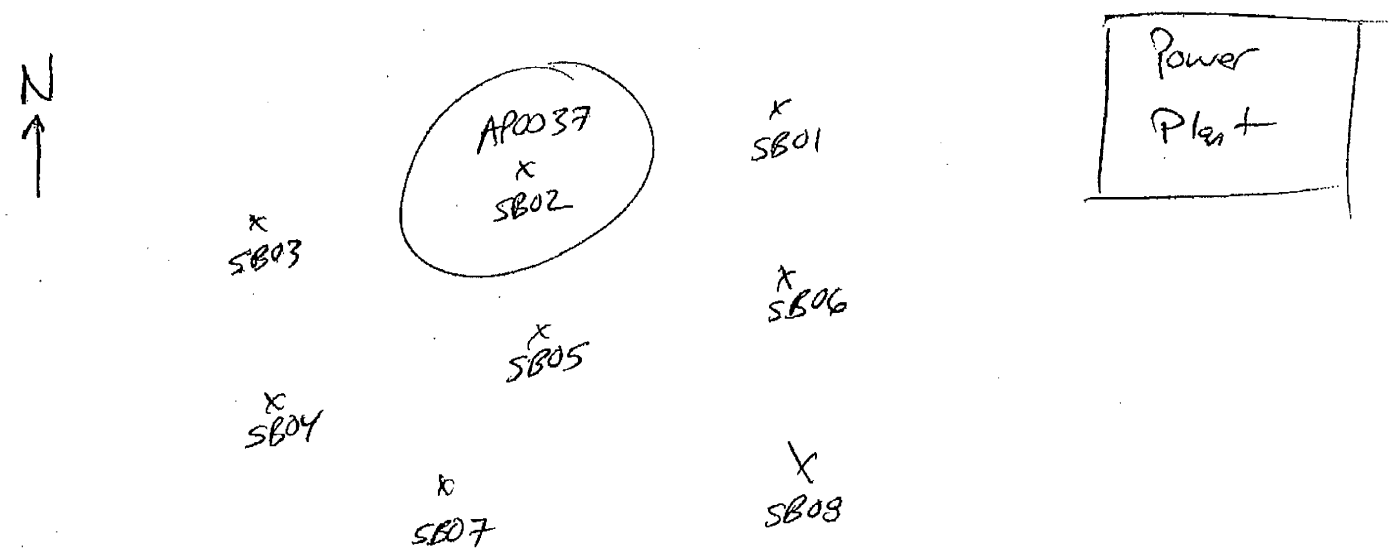
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Black fine to med sand w/ Ash
moist to wet, no odor

Sketch Location: see figure 1



Logged BY / Date: [signature] 8/19/09 *Reviewed BY / Date:* [signature] 5/11/201

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082009ACCT

Location Code: **ASH PIT 3-SB03**
Sample Number: **AP0039**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB03-AP0039-(~~0-1~~)** 0.2-1.7
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: 1655
Start Depth: 0.2
End Depth: 1.7
Sample Matrix: **SOIL**
Sample Team: B. Tiell, C. Stazopoks

QC Partners:
(TB) N (ER) N (FB) N

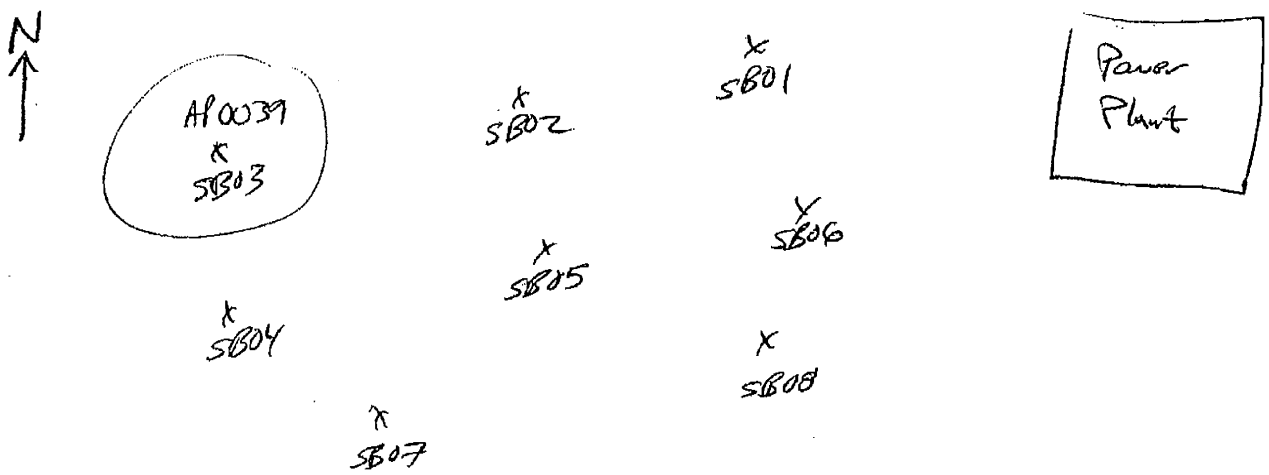
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Black, fine to medium sand w/ Ash, moist, no odors

Sketch Location: see figure 1



Logged BY / Date: [signature] 8/19/09 *Reviewed BY / Date:* Edward [signature] 5/11/2

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PBOB 2009 ACCT

Location Code: **ASH PIT 3-SB03**
Sample Number: **AP0040MS**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB03-AP0040MS-(0.2-1.7)**
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **MS**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: 1655
Start Depth: 0.2
End Depth: 1.7
Sample Matrix: **SOIL**
Sample Team: B. Teel, S. Stroyle

QC Partners:
(TB) N (ER) N (FB) N

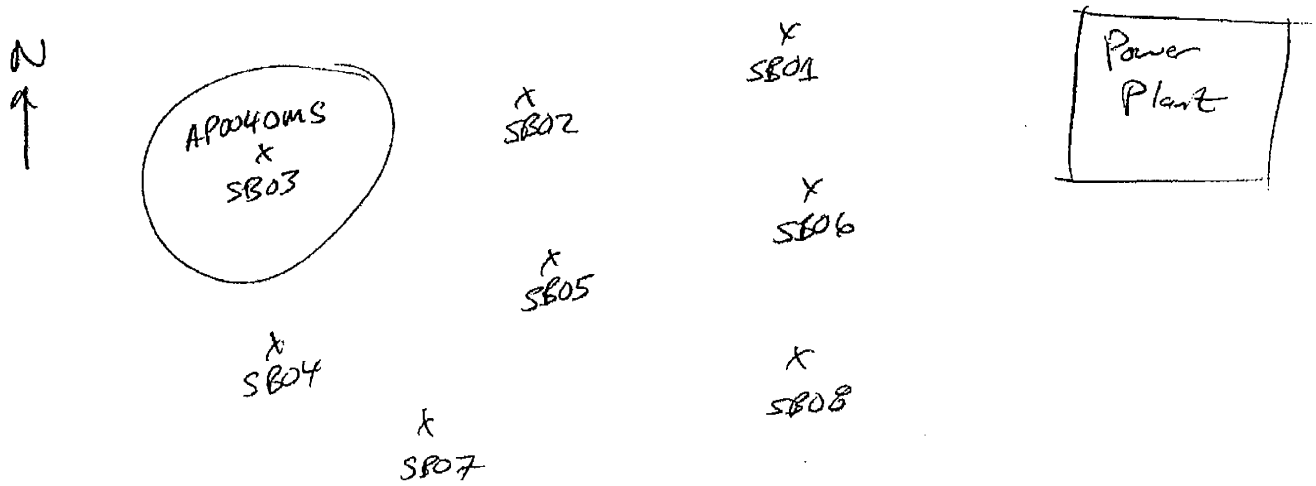
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: see AP 0039

Sketch Location: see figure 1



Logged BY / Date: C. S. 8/19/09 *Reviewed BY / Date:* Edward [illegible] 5/11/2010

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Sample Collection Log

132457 · PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08 2009 ACCT

Location Code: **ASH PIT 3-SB03**
Sample Number: **AP0040MSD**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB03-AP0040MSD** (0.2-1.7)
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **MS**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/19/09
Collection Time: ~~1455~~ CDT 1655
Start Depth: 0.2
End Depth: 1.7
Sample Matrix: **SOIL**
Sample Team: B. Tiel, C. Strayla

QC Partners:
(TB) N (ER) N (FB) N

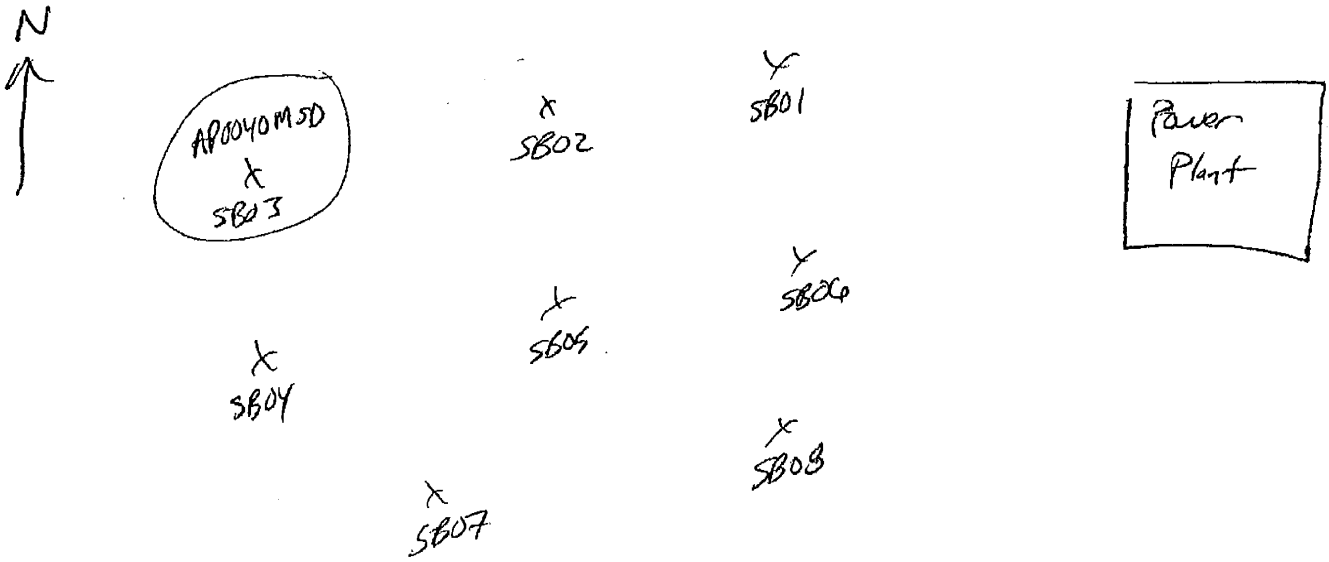
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: See AP0039

Sketch Location: see figure 1



Logged BY / Date: C.S. 8/19/09 *Reviewed BY / Date:* Edward J. Marion 5/11/201

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB04**
Sample Number: **AP0042**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB04-AP0042-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/21/09
Collection Time: 1020
Start Depth: 4" (0.3')
End Depth: 9" (0.8')
Sample Matrix: **SOIL**
Sample Team: B Tiell C. Stumpler

QC Partners:
(TB) N (ER) N (FB) N

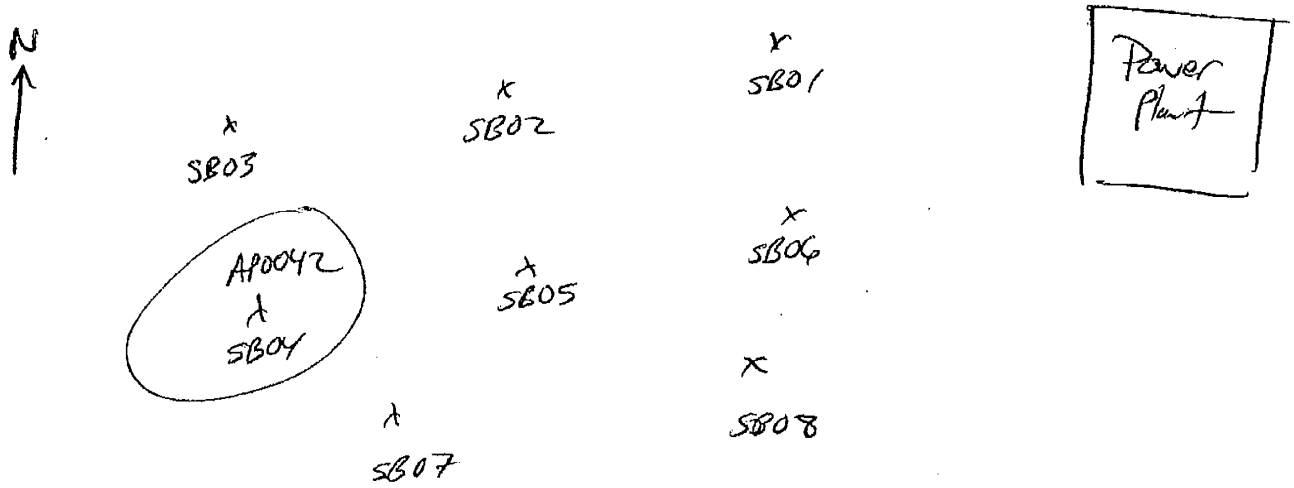
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: fine sand w/ ash, black, moist
no odor

Sketch Location: see figure 1



Logged BY / Date: C. S. 8/21/09 *Reviewed BY / Date:* Edward S. Weaver 5/11/20

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB04**

Sample Number: **AP0043**

Sample Name: **PBOW-08-DS-ASH PIT 3-SB04-AP0043-~~(3-5)~~** 9"-18"

Sampling Method: **HA**

Sample Type: **DS** *Sample Purpose:* **REG**

Sampling Equip: SS Hand Auger

QC Partners:

(TB) N (ER) N (FB) N

Task: **132288**

Collection Date: 8/21/09

Collection Time: 1030

Start Depth: 9" (0.8')

End Depth: 18" (1.5')

Sample Matrix: **SOIL**

Sample Team: R. Tull C. Stryker

ERPIMS Values:

Sacode:

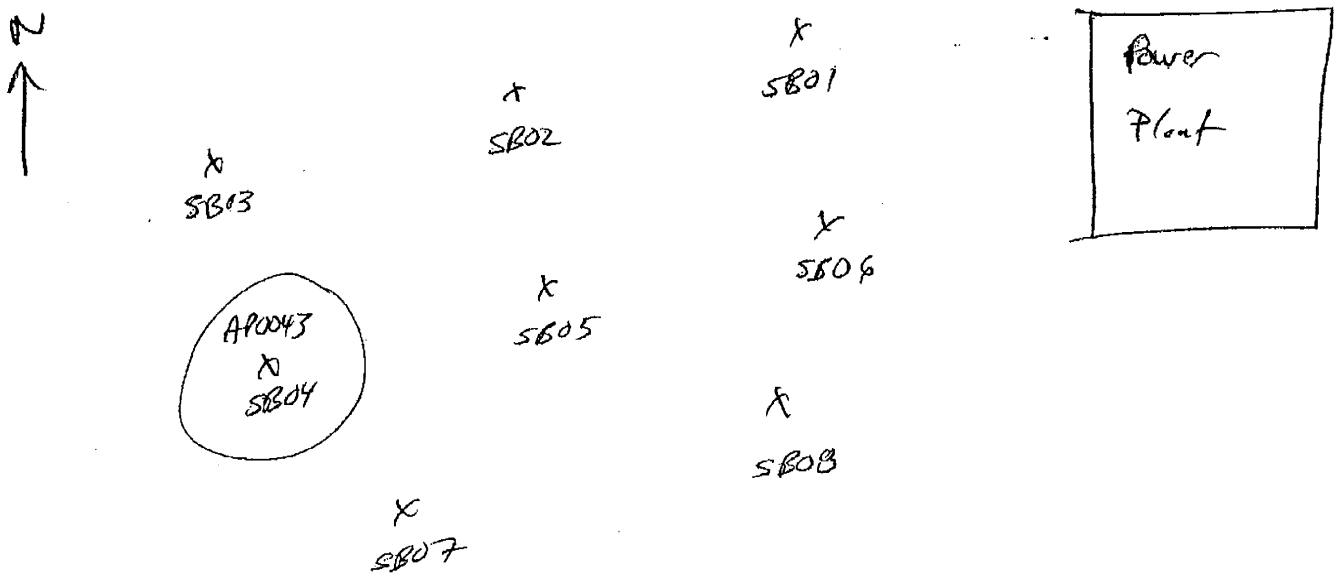
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: clayey, fine sand, gray w/ brown mottling, no odor wet to moist

Sketch Location: see figure 1



Logged BY / Date: C. S 8/21/09 *Reviewed BY / Date:* Edward G. Weaver 5/11/2010

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08 2109 ACCT

Location Code: **ASH PIT 3-SB05**
Sample Number: **AP0045**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB05-AP0045-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S Hand Auger
QC Partners:
(TB) N (ER) N (FB) N

Task: **132288**
Collection Date: 8/21/09
Collection Time: 1115
Start Depth: 3" (0.3')
End Depth: 12" (1.0')
Sample Matrix: **SOIL**
Sample Team: BT, CPS

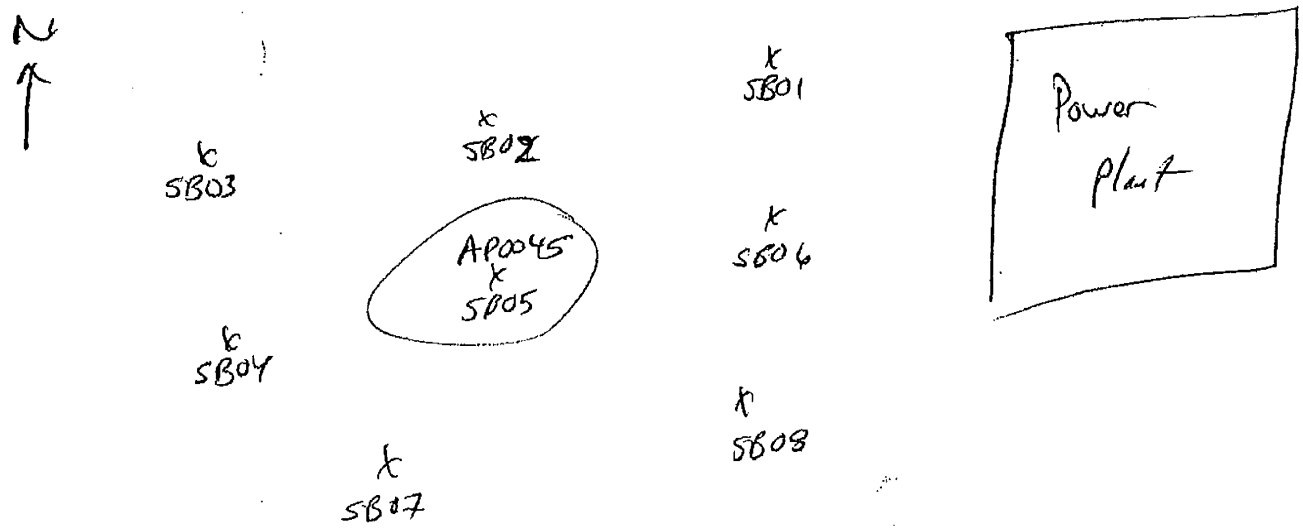
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: fine to med sand w/ ash black
moist to wet no odor

Sketch Location: See figure 1



Logged BY / Date: 8/21/09

Reviewed BY / Date: 5/11/201

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB05**
Sample Number: **AP0046**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB05-AP0046-(~~3-5~~)** 1'-2'
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/21/09
Collection Time: 1126
Start Depth: 12" (1.0')
End Depth: 24" (2.0')
Sample Matrix: **SOIL**
Sample Team: BTiell CStrzepka

QC Partners:
(TB) N (ER) N (FB) N

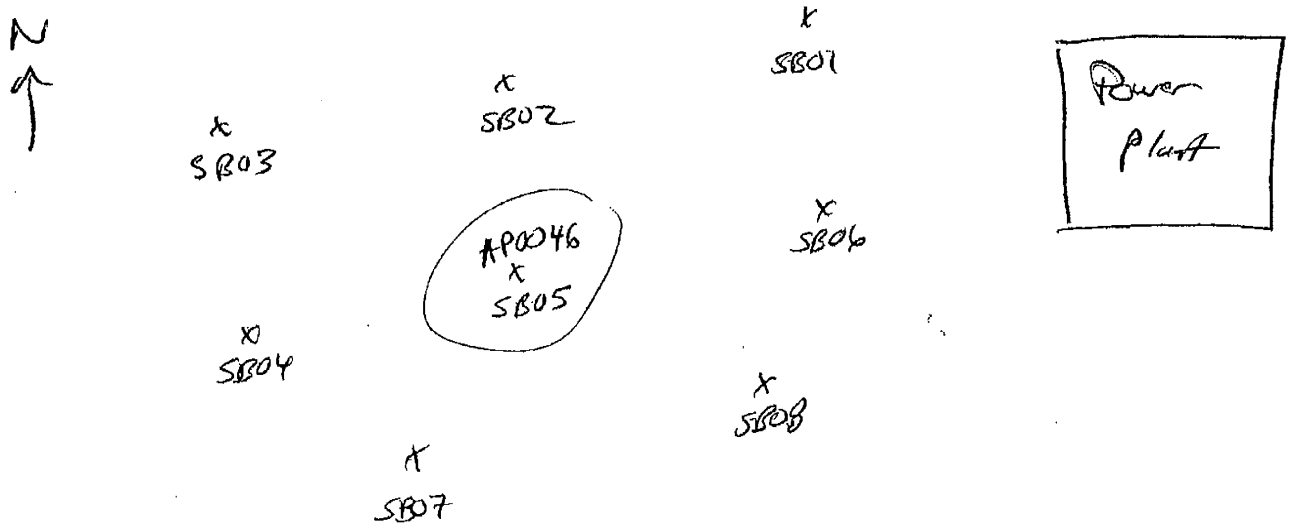
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: clayey silt and fine sand gray w/ brown mottling no odor damp

Sketch Location: See figure 1



Logged BY / Date: C Stz 8/21/09

Reviewed BY / Date: Edward Weaver 5/11/20

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB06**
Sample Number: **AP0048**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB06-AP0048-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/20/09
Collection Time: 1530
Start Depth: 0.2
End Depth: 1.0
Sample Matrix: **SOIL**
Sample Team: B. Toll, C. Strzepka

QC Partners:
(TB) N (ER) N (FB) N

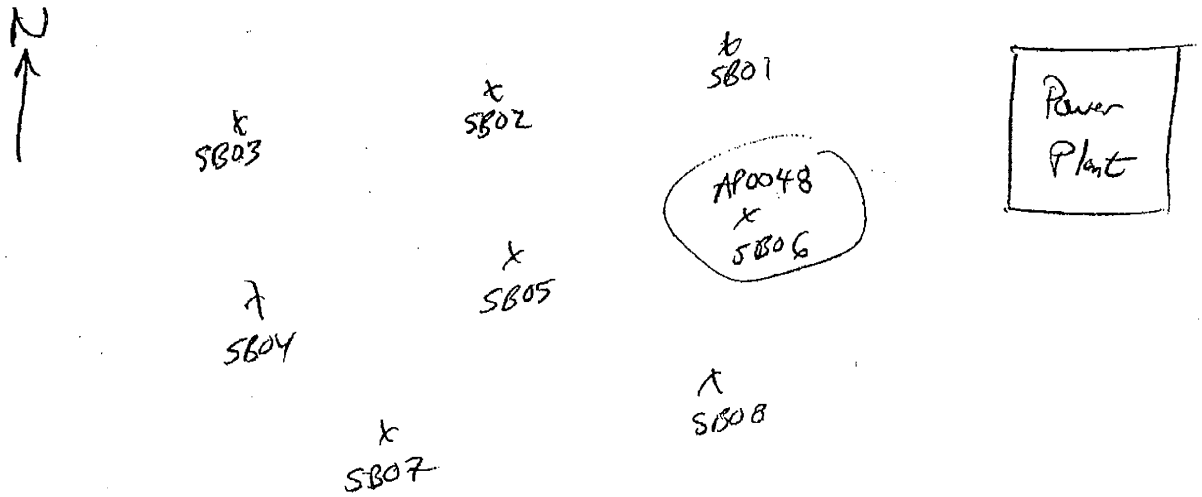
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: fine to med. sand w/ mixture of ash, brown & black clays, no odor

Sketch Location: see figure 1



Logged BY / Date: C. S. / 8/20/09

Reviewed BY / Date: Edward S. Weir 5/10/201

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: ASH PIT 3-SB06
Sample Number: AP0049
Sample Name: PBOW-08-DS-ASH PIT 3-SB06-AP0049-~~(3-5)~~ 1-2
Sampling Method: HA
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: S.S. Hand auger

Task: 132288
Collection Date: 8/20/08
Collection Time: 1540
Start Depth: 1.0
End Depth: 2.0
Sample Matrix: SOIL
Sample Team: B. Tiell, C. Strzeszyka

QC Partners:
(TB) N (ER) N (FB) N

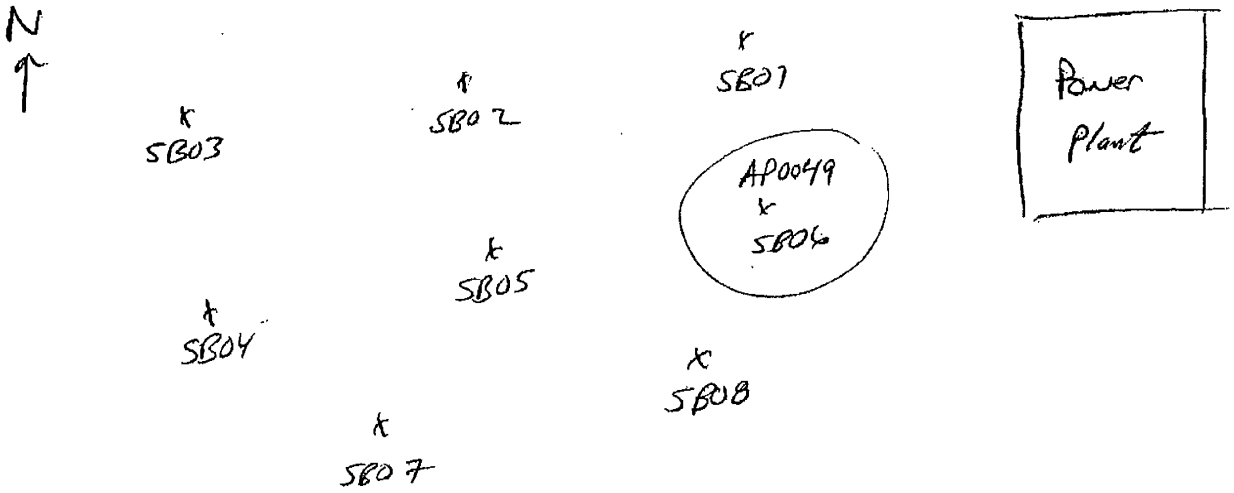
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: black/gray, fine to med sand, moist w/ ash
no odor

Sketch Location: see figure 1



Logged BY / Date: C. Strzeszyka 8/20/09 *Reviewed BY / Date:* Edward Klein 5/11

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB0821 09ACCT

Location Code: ASH PIT 3-SB06
Sample Number: AP0061
Sample Name: PBOW-08-SS-ASH PIT 3-SB06-AP0061
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: S.S. Hand Auger

Task: 132288
Collection Date: 8/20/09
Collection Time: 1645
Start Depth: 2.0
End Depth: 2.7
Sample Matrix: SOIL
Sample Team: B. Tiell, C. Strzepka

QC Partners:
(TB) N (ER) N (FB) N

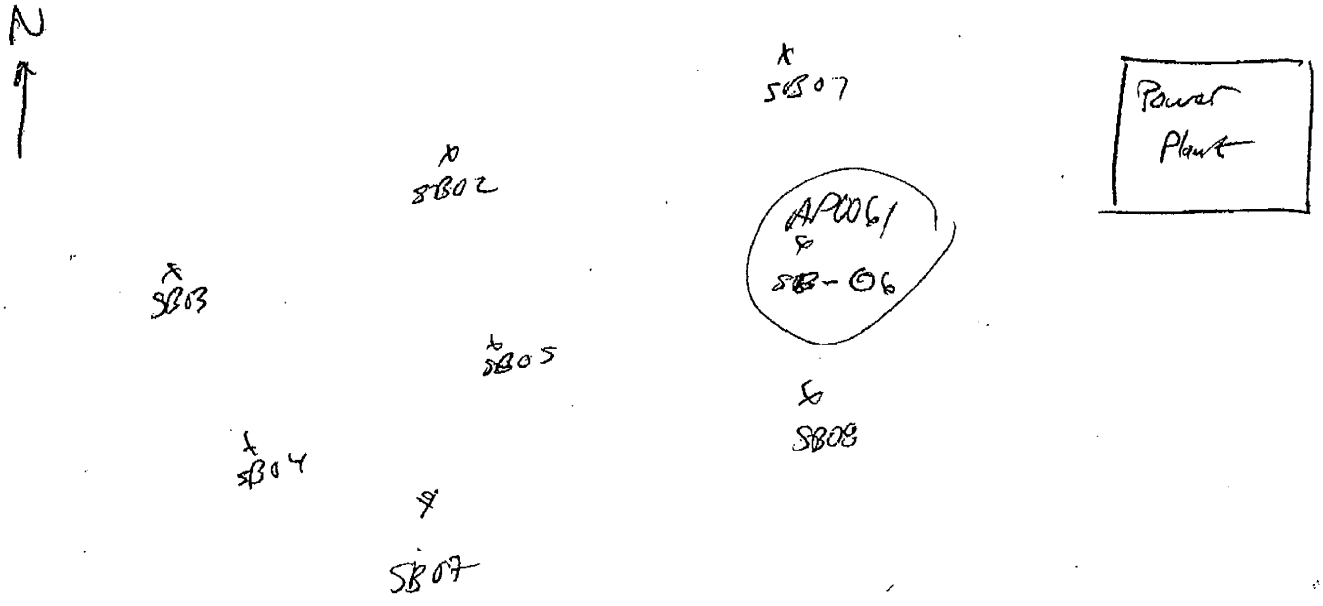
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: silty clay (under clay), gray mottled brown, moist to wet, no odor

Sketch Location: see figure 1



Logged BY / Date: [signature] / 8/20/09

Reviewed BY / Date: Edward G. Weaver 5/11/20

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB07**
Sample Number: **AP0051**
Sample Name: **PBOW-08-SS-ASH PIT 3-SB07-AP0051-(0-1)**
Sampling Method: **HA**
Sample Type: **SS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

QC Partners:
(TB) N (ER) N (FB) N

Task: **132288**
Collection Date: 8/21/09
Collection Time: 0905
Start Depth: 0'
End Depth: 1'
Sample Matrix: **SOIL**
Sample Team: B. Tiell, C. Straight

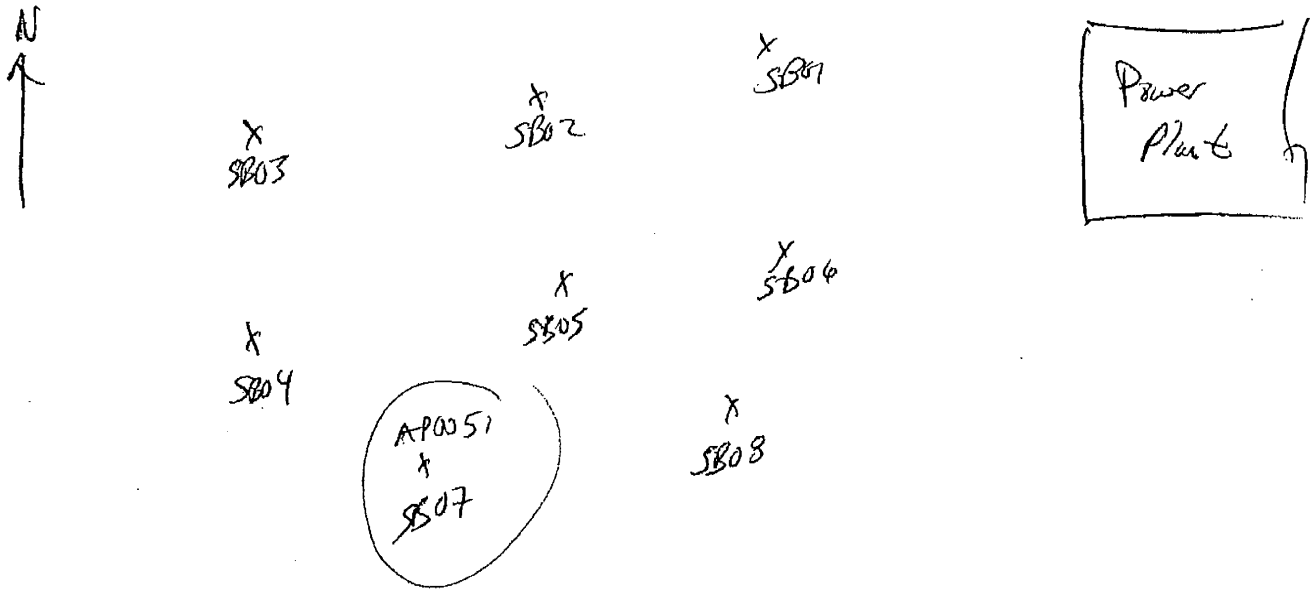
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: clayey silt gray & black w/ regitative organic material moist to wet

Sketch Location: See figure 1



Logged BY / Date: 8/21/09 *Reviewed BY / Date:* Edward E. Weaver 5/11/2010

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08 2109ACCT

Location Code: **ASH PIT 3-SB07**
Sample Number: **AP0052**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB07-AP0052-~~(3-5)~~** 1-2
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/21/09
Collection Time: 0920
Start Depth: 1'
End Depth: 2'
Sample Matrix: **SOIL**
Sample Team: B Tiell C. Stangle

QC Partners:
(TB) N (ER) N (FB) N

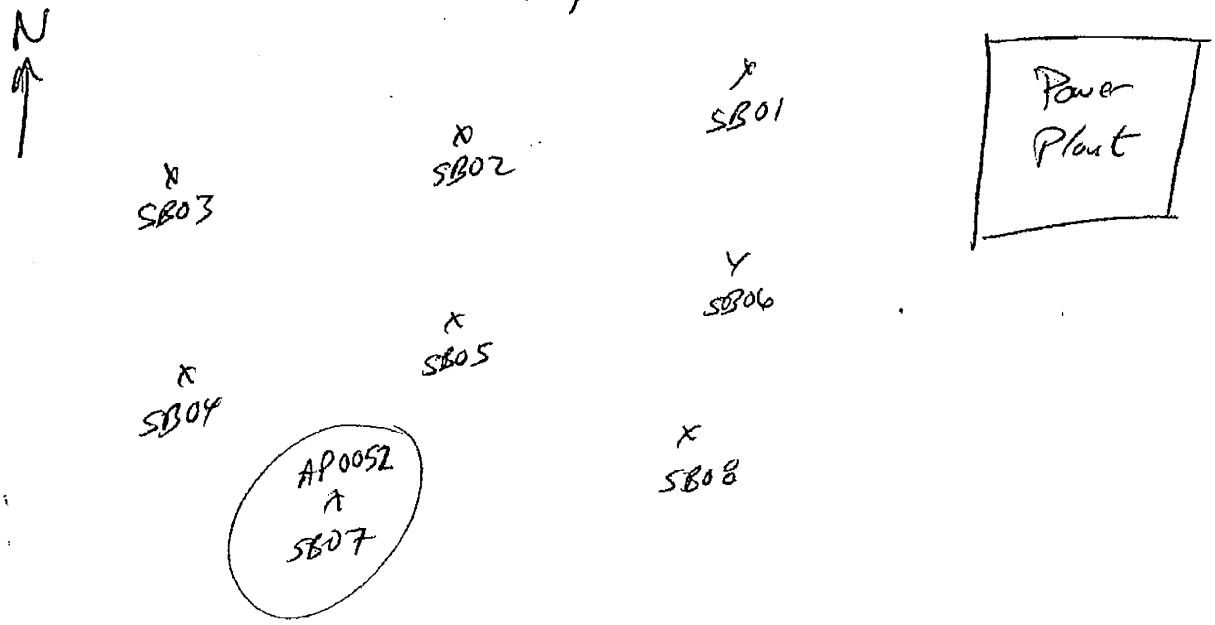
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: silty clay, gray, brown mottled moist, no odor

Sketch Location: see figure 1



Logged BY / Date: C. St 8/21/09 *Reviewed BY / Date:* Edward S. Weave 5/11/2011

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08 2109ACCT

Location Code: ASH PIT 3-SB07
Sample Number: AP0059
Sample Name: PBOW-08-DS-ASH PIT 3-SB07-AP0059-(~~3-5~~) 1-2
Sampling Method: HA
Sample Type: DS *Sample Purpose:* FD
Sampling Equip: S.S. Hand Auger

Task: 132288
Collection Date: 8/21/09
Collection Time: 0920
Start Depth: 1'
End Depth: 2'
Sample Matrix: SOIL
Sample Team: B Tell C Strzaplen

QC Partners:
(TB) N (ER) N (FB) N

ERPIMS Values:
Sacode:
Lot Controlf:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

Comments: see AP0052

Sketch Location: see figure 1, see AP0052

Logged BY / Date: [illegible] 8/21/09

Reviewed BY / Date: Edward [illegible] 5/11/2010

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB07**
Sample Number: **AP0060**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB07-AP0060-(~~3-5~~)** 1-2
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **FS**
Sampling Equip: S.S. Hand Auger

Task: **132288**
Collection Date: 8/21/09
Collection Time: 0920
Start Depth: 1
End Depth: 2
Sample Matrix: **SOIL**
Sample Team: B Tiell, C. Streepks

QC Partners:
(TB) N (ER) N (FB) N

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS	N	B	2	4	oz	CWM
PCB3	N	B	2	4	oz	CWM
SEMIVOLATILES	N	B	2	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: see AP0052

Sketch Location: see figure 1, see AP0052

Logged BY / Date: [signature] 8/21/09

Reviewed BY / Date: Edward [illegible] 5/11/20

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08ZU99ACCT

Location Code: ASH PIT 3-SB08
Sample Number: AP0054
Sample Name: PBOW-08-SS-ASH PIT 3-SB08-AP0054-(~~0-1~~) 3"-1'
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: SS Hand auger

Task: 132288
Collection Date: 8/21/09
Collection Time: 1330
Start Depth: 3" (0.3')
End Depth: 12" (1')
Sample Matrix: SOIL
Sample Team: B. Tiell C. Stazen

QC Partners:
(TB) N (ER) N (FB) N

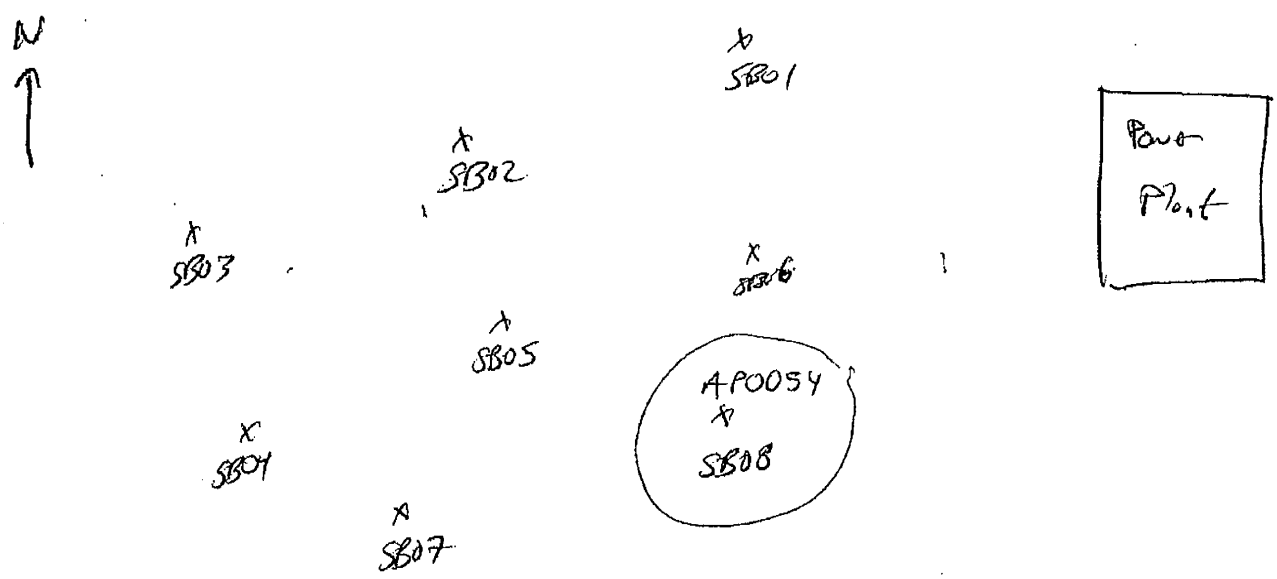
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: fine to med sand, w/ ash, black, no odor not

Sketch Location: see figure 1



Logged BY / Date: C. Stazen 8/21/09 *Reviewed BY / Date:* Edward Swanson 5/11/201

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: ASH PIT 3-SB08
Sample Number: AP0056
Sample Name: PBOW-08-DS-ASH PIT 3-SB08-AP0055-~~(3-5)~~ 3"-12"
Sampling Method: HA
Sample Type: DS *Sample Purpose:* FD
Sampling Equip: S.S. Hand Auger

QC Partners:
(TB) N (ER) N (FB) N

Task: 132288
Collection Date: 8/21/09
Collection Time: 1330
Start Depth: 3" (0.3')
End Depth: 12" (1')
Sample Matrix: SOIL
Sample Team: B Trell, C Strzempk

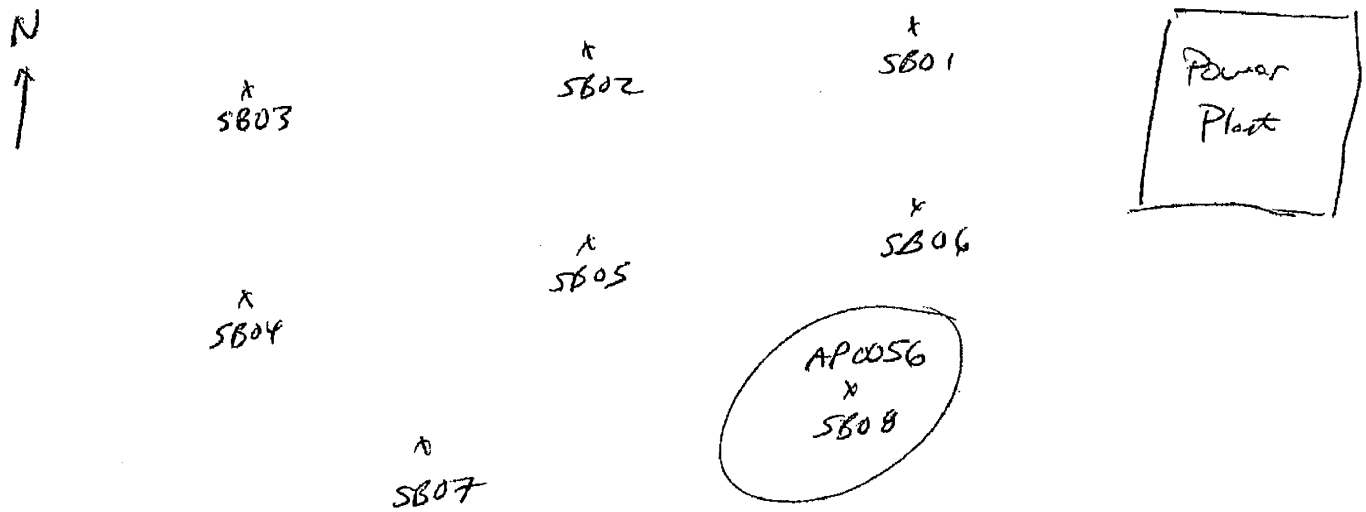
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: fine to med sand w/ ash, black
no odor, wet

Sketch Location: see figure 1



Logged BY / Date: C. S. 8/21/09

Reviewed BY / Date: Edward H. Wenz 5/11/2011

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB08 2109 TA

Location Code: **ASH PIT 3-SB08**

Sample Number: **AP0057**

Sample Name: **PBOW-08-DS-ASH PIT 3-SB08-AP0055-~~(3-5)~~** 3"-12"

Sampling Method: **HA**

Sample Type: **DS** *Sample Purpose:* **FS**

Sampling Equip: S.S. Hand Auger

QC Partners:
(TB) N (ER) N (FB) N

Task: **132288**

Collection Date: 8/21/09

Collection Time: 1330

Start Depth: 3" (0.3')

End Depth: 12" (1')

Sample Matrix: **SOIL**

Sample Team: B. Tiell, C. Strzepka

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS	N	B	2	4	oz	CWM
PCBS	N	B	2	4	oz	CWM
SEMIVOLATILES	N	B	2	4	oz	CWM

Comments: see AP0056 and AP0055

Sketch Location: see AP0056 and AP0055

Logged BY / Date: [signature] 8/21/09 *Reviewed BY / Date:*

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB082109ACCT

Location Code: **ASH PIT 3-SB08**
Sample Number: **AP0055**
Sample Name: **PBOW-08-DS-ASH PIT 3-SB08-AP0055-~~(3-5)~~** 1'-2'
Sampling Method: **HA**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: S.S. Hand auger

Task: **132288**
Collection Date: 8/21/09
Collection Time: 1345
Start Depth: 1'
End Depth: 2'
Sample Matrix: **SOIL**
Sample Team: B. Tiell, C. Strzepka

QC Partners:
(TB) N (ER) N (FB) N

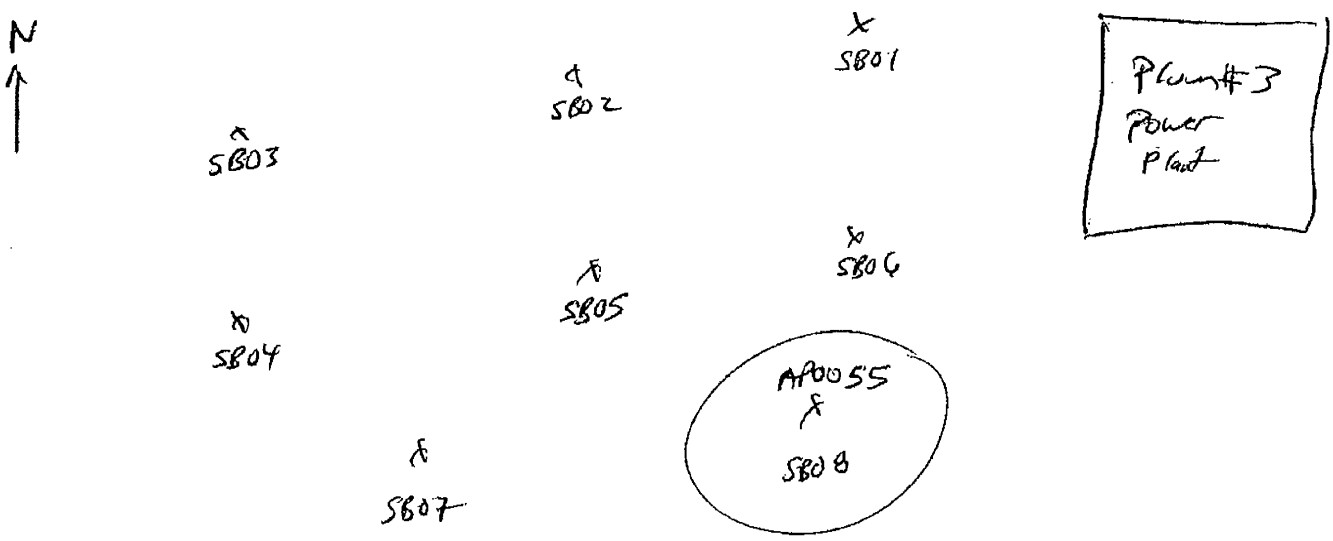
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Controlt#:

Comments: gray clay w/silt, w brown mottling
dry to moist, no odor

Sketch Location: see figure 1



Logged BY / Date: 8/21/09 *Reviewed BY / Date:*

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121208AML

Location Code: ASH PIT 1-PZ01
Sample Number: AP3000
Sample Name: PBOW-08-GW-ASH PIT 1-PZ01-AP3000
Sampling Method: PP
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: YSI 6820 / Peristaltic pump / Teflon Lined Tubing

Task: 132288
Collection Date: 12/12/08
Collection Time: 1100
Start Depth: 19'
End Depth: 19'
Sample Matrix: WATER

QC Partners:
(TB) — (ER) — (FB) 122008-1, 122008-2

Sample Team: M. Yantin / E. Veaver / D. Kessler

ERPIMS Values:
Sacode:
Lot Control#:

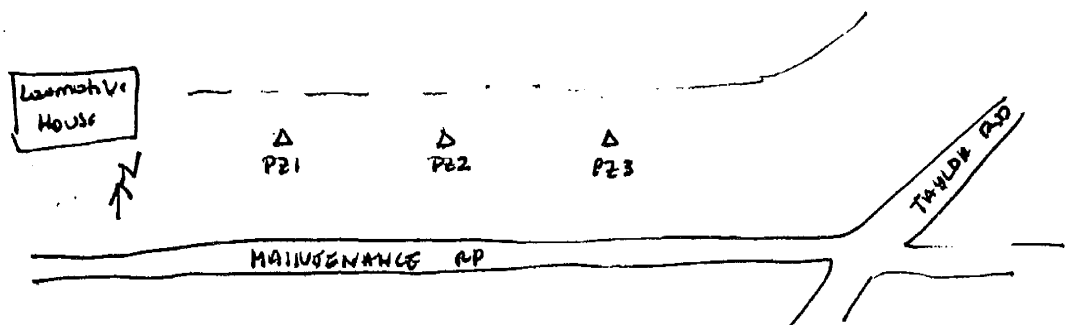
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:
Measured Well Depth: 20.2' toc **Depth To Water:** 7.22' toc

Comments: Purge rate: 180 mL/min
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin 12/12/08 *Reviewed BY / Date:* Edward G. Weaver 1-20-09

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: ~~BWXT - Source Area~~ API

Sampling location ID: API-PZ01

Sample ID: AP3000

Weather: Cold / Snow High 30°

Collection Time/Date: 12/12/08 1100

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: D. Kessler / H. Yantin / E. Weaver

Casing diameter (inches): 1

Total well depth (ft. BTOC): 20.2' toc

Bladder Pump Settings: CPM NA

Refill (seconds): NA

Discharge (seconds): NA

Throttle (psi): NA

Discharge tube length (ft): 25

Screen Interval (ft. BTOC): 10.2 to 20.2

Pump intake depth (ft BTOC): 19' toc

Max. sustainable pump rate (mL/min): 180 mL/min

Appearance of product: NA No product

Discharge tube OD diameter (3/8" or 1/4"):

Inlet reducer used (Y/N): No

PID reading: 4.2 ppm

LEL: LEL: 0 %; Oxygen: 20.8 %;
Carbon: 0 ppm
H_2S: 0.0

Purging

Purging/sampling crew: D. Kessler / H. Yantin / E. Weaver

Purge date/beginning time: 12/12/08 1023

Purge date/completion time: 12/12/08 1058

Initial (pre-purging) DTW (ft. BTOC): 7.22' toc

Final (post-purging) DTW (ft. BTOC): 9.85

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = 0.5 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft., (3/8" ID tubing) = 0.015 Liters/ft.

Tubing Length = 25 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (0.01 L/ftx____ft) + 0.5 L = ____L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (1)^2) = 0.041 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 12.98 ft x .041 Gal/ft = .532 gallons

Volume of Water in Filter Pack:

~~Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches~~

~~= (0.041 x ((_____)^2 - (_____)^2) = _____gal/ft~~

~~Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%)~~

~~= ((Screen Height _____ft + _____ft) x _____gal/ft) x 0.3 = 2.01 gallons~~

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + .532 gal = .532 gal x 3.785 L/gal = ____L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
2.01	4.02	6.03	8.04	10.05

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

~~Monitoring Well~~ API - PB 01

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
12/12/08	1028	7.22	270	10.68	5.85	0.920	3.60	154.2	796.2	0
"	1033	11.21	"	10.44	7.02	0.851	4.87	126.1	703.2	1.35
"	1043	10.60	"	10.23	7.69	0.815	7.19	134.0	204.6	4.05
"	1048	9.74	180	9.88	7.39	0.830	6.14	132.9	184.4	5.13
"	1053	9.74	"	10.12	7.36	0.831	6.07	134.1	212.5	6.03
"	1058	9.85	"	10.12	7.36	0.832	5.95	131.2	146.9	6.93

Groundwater Sample Collected:

12/12/08	1058	9.85	180	10.12	7.36	0.832	5.95	131.2	146.9	6.93

Comments: Total Volume Removed: 6.93 L (Liter to gallons = ____ L x 0.264 gallons per liter = ____ L)

(Gallons to liters = ____ gal x 3.785 liters per gallon = ____ Gal)

Changed rate @ 1045 to 180 mL/min

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 12 12 08AHL

Location Code: ASH PIT 1-PZ02
Sample Number: AP3001
Sample Name: PBOW-08-GW-ASH PIT 1-PZ02-AP3001
Sampling Method: PP
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: Peristaltic pump / ysi 6920 / Teflon-Lined Tubing

Task: 132288
Collection Date: 12/11/08
Collection Time: 1535
Start Depth: 16'
End Depth: 16'
Sample Matrix: WATER

QC Partners:
(TB) — (ER) — (FB) —

Sample Team: M. Yantis / M. Gunderson

ERPIMS Values:
Sacode:
Lot Control#:

Containers

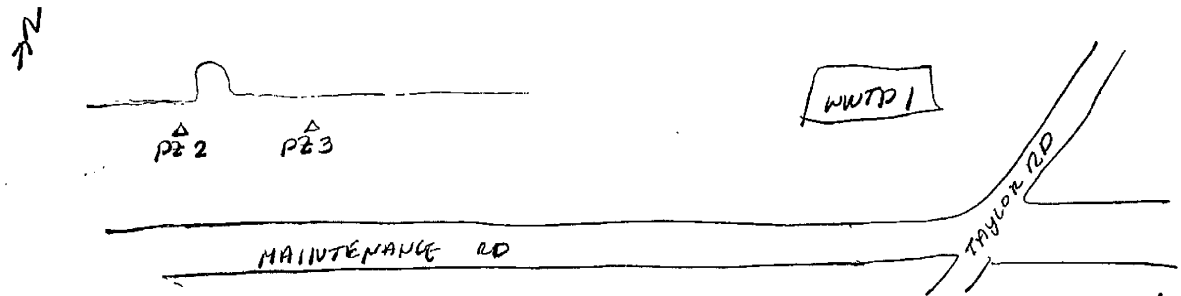
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 20.2' TOC Depth To Water: 7.14' TOC

Comments: Purge rate: 180 ml/min
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantis 12/11/08 *Reviewed BY / Date:* Edward SCNewman 1-20-09

GROUNDWATER SAMPLING FORM

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Sheet 1 of 2

Area or Site ID: ~~BWXT - Source Area~~ AP 1

Sampling location ID: AP1 -D2 02

Sample ID: ~~[illegible]~~ AP3001

Weather: Cold High 38°

Collection Time/Date: 12/11/08 1535

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: ~~D. Kessler~~ / M. Yardin / M. Gundersen

Screen Interval (ft. BTOC): 10.2 to 20.2

Casing diameter (inches): 1

Pump intake depth (ft BTOC): 16' toc

Total well depth (ft. BTOC): 20.2' toc

Max. sustainable pump rate (mL/min): 180

Bladder Pump Settings: CPM NA

Appearance of product: NA No product

Refill (seconds): NA

Discharge tube OD diameter (3/8) or 1/4"):

Discharge (seconds): NA

Inlet reducer used (Y/N): No

Throttle (psi): NA

PID reading: 0 ppm

Discharge tube length (ft): 25'

LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: ~~D. Kessler~~ / M. Yardin / M. Gundersen

Purge date/beginning time: 12/11/08 ~~1335~~, 1457

Purge date/completion time: 12/11/08 1535

Initial (pre-purging) DTW (ft. BTOC): 7.14

Final (post-purging) DTW (ft. BTOC): 10.92

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = _0.5_ Liters

Tubing Liters/ft. (1/4" ID tubing) = __0.01__Liters/ft., (3/8" ID tubing) = _0.015__Liters/ft.

Tubing Length = __25__ ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (__0.01__ L/ftx____ft) + 0.5 L NA L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (__1__)^2) = 0.041 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 13.08 ft x .041 Gal/ft = 0.536 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= (0.041 x ((NA)^2 - (NA)^2) = NA gal/ft

Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%)

= ((Screen Height NA ft + NA ft) x NA gal/ft) x 0.3 = NA gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + 0.536 gal = .536 gal x 3.785 L/gal = 2.03 L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
2.03	4.06	6.09	8.12	10.15

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Monitoring Well API-PZ2

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
12/11/08	1502	10.59	350	10.59	8.19	0.770	7.11	79.7	>1000	1.75
"	1507	10.92	260	11.00	7.62	0.732	5.48	64.4	>1000	3.05
"	1512	10.99	"	10.65	7.29	0.700	4.29	81.4	>1000	4.35
"	1520	10.72	180	10.48	7.19	0.681	5.26	104.6	669.1	5.25
"	1525	10.75	"	10.41	7.06	0.683	4.99	106.0	759.8	~~5.88~~ 6.15
"	1530	10.86	"	10.40	6.93	0.682	4.82	107.5	711.1	7.05
"	1535	10.92	"	10.34	6.83	0.679	4.75	109.4	566.4	7.95

MM 12/11/08

Groundwater Sample Collected:

12/11/08	1535	10.92	180	10.34	6.83	0.679	4.75	109.4	566.4	7.95

Comments: Total Volume Removed: 7.95 L (Liter to gallons = 7.95 L x 0.264 gallons per liter = 2.09 L)
(Gallons to liters = NA gal x 3.785 liters per gallon) = NA Gal)

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: NA

Location Code: **ASH PIT 1-PZ03**
Sample Number: **AP3002**
Sample Name: **PBOW-08-GW-ASH PIT 1-PZ03-AP3002**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: YSI 6820 Peristaltic pump/Teflon-Lined Tubing

Task: **132288**
Collection Date: 12/11/08
Collection Time: NA
Start Depth: NA
End Depth: NA
Sample Matrix: **WATER**

QC Partners:
(TB) — (ER) — (FB) —

Sample Team: M. Yantin/MGunderson

ERPIMS Values:
Sacode:
Lot Control#:

Containers

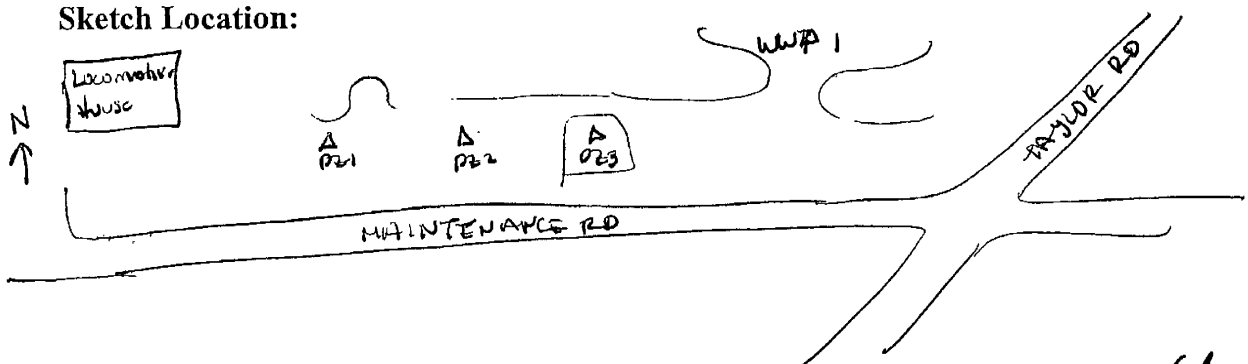
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Well Not Sampled

Groundwater Information:
Measured Well Depth: 20.2' toc **Depth To Water:** 8.90' toc

Comments: Well will not be sampled due to insufficient water and slow recharge.
Recharge rate: 0.25ft/4 min.

Sketch Location:



Logged BY / Date: M. Yantin 12/11/08 *Reviewed BY / Date:* Edward K. Meier 1-20

GROUNDWATER SAMPLING FORM

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Sheet 1 of 2

Area or Site ID: **BWXT - Source Area**

Sampling location ID: API-PZ-3
Sample ID: ~~[illegible]~~ NA AP-3002
Collection Time/Date: 12/12/08

Weather: Cold 38°

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: ~~D. Kessler~~ / M. Yantin
Casing diameter (inches): 1
Total well depth (ft. BTOC): 20.2 ft
Bladder Pump Settings: CPM NA
Refill (seconds): NA
Discharge (seconds): NA
Throttle (psi): NA
Discharge tube length (ft): 25

Screen Interval (ft. BTOC): 10.2 to 20.2
Pump intake depth (ft BTOC): 15
Max. sustainable pump rate (mL/min): 400
Appearance of product: NA No product
Discharge tube diameter (3/8" or 1/4"):
Inlet reducer used (Y/N): No
PID reading: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.2 %;
Carbon: 0 ppm

Purging

Purging/sampling crew: ~~D. Kessler~~ / M. Yantin / M. Gunderson
Purge date/beginning time: 12/11/08 1428
Initial (pre-purging) DTW (ft. BTOC): 8.90

Purge date/completion time: 12/11/08 1435
Final (post-purging) DTW (ft. BTOC): dry

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = _0.5_ Liters

Tubing Liters/ft. (1/4" ID tubing) = __0.01__Liters/ft., (3/8" ID tubing) = _0.015__Liters/ft.

Tubing Length = 25 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (__0.01__ L/ftx____ft) + 0.5 L = NA L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (1)^2) = 0.041 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 11.3 ft x .041 Gal/ft = .46 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= (0.041 x ((_____)^2 - (_____)^2) = _____ gal/ft
Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%) MR
= ((Screen Height _____ ft + _____ ft) x _____ gal/ft) x 0.3 = 1.75 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + .46 gal = .46 gal x 3.785 L/gal = 1.75 L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
1.75	3.5	5.25	7.0	8.75

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

~~Monitoring Well~~ Piezometer — MP1 - 023

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
12/11/08	1438	8.90	400	10.45	7.88	.804	1.61	53.2	1247.1	3.2
"	1439	well dry								

Well Not Sampled

Groundwater Sample Collected:

Comments: Total Volume Removed: 3.2 L (Liter to gallons = NA L x 0.264 gallons per liter = NA L)
(Gallons to liters = NA gal x 3.785 liters per gallon) = NA Gal)

well not sampled, slow recharge.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 121508 AHL

Location Code: **ASH PIT 1-PZ04**
Sample Number: **AP3003**
Sample Name: **PBOW-08-GW-ASH PIT 1-PZ04-AP3003**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Peristaltic pump 1951 6820/Teflon Lined Tubing

Task: **132288**
Collection Date: 12/15/08
Collection Time: 1350
Start Depth: 20'
End Depth: 20'
Sample Matrix: **WATER**
Sample Team: D. Kessler E. Weaver/ M. Yantin

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

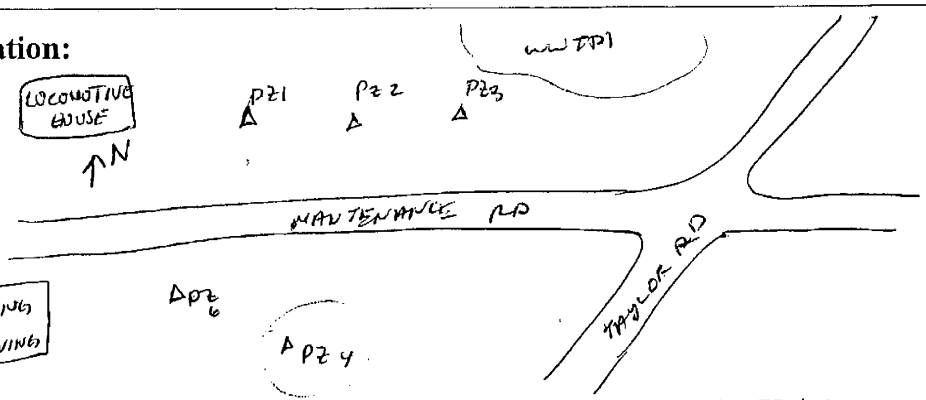
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE DKK
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:
Measured Well Depth: 20.8' toc **Depth To Water:** 2.44' toc

Comments: Purge rate: 138 mL/min
Iron Hach Test: ~~20 mg/L~~ Not Measured. (Turbidity > 1000 NTU) DKK

Sketch Location:



Logged BY / Date: M. Yantin / 12/15/08 *Reviewed BY / Date:* Edward G. Weaver 1-20-0

GROUNDWATER SAMPLING FORM

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Sheet 1 of 2

Area or Site ID: ~~BWXT - Source Area~~ AP1

Sampling location ID: AP1-PZ-04

Sample ID: MW 3005 / AP 3003 / MW 3013

Weather: Cold 28°

Collection Time/Date: 12/15/08 ~~1321~~ 1350 MR

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: D. Kessler / E. Weaver / M. Yantin

Casing diameter (inches): 1

Total well depth (ft. BTOC): 20.8' toc

Bladder Pump Settings: CPM NA

Refill (seconds): NA

Discharge (seconds): NA

Throttle (psi): NA

Discharge tube length (ft): NA

Screen Interval (ft. BTOC): 10.8' to 20.8

Pump intake depth (ft BTOC): 20'

Max. sustainable pump rate (mL/min): 138

Appearance of product: NA No product

Discharge tube diameter (3/8" or 1/4"):

Inlet reducer used (Y/N): No

PID reading: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

H_2S: 0

Purging

Purging/sampling crew: D. Kessler / E. Weaver / M. Yantin

Purge date/beginning time: 1312 12/15/08

Purge date/completion time: 12/15/08 1345

Initial (pre-purging) DTW (ft. BTOC): 2.44' toc

Final (post-purging) DTW (ft. BTOC): 17.50

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = 0.5 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft., (3/8" ID tubing) = 0.015 Liters/ft.

Tubing Length = 25 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (0.01 L/ftx ____ft) + 0.5 L = NA L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (1)^2) = 0.041 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 18.34 ft x .041 Gal/ft = .75 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= (0.041 x ((_____)^2 - (_____)^2) = _____gal/ft

Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%)

= ((Screen Height _____ft + _____ft) x _____gal/ft) x 0.3 = _____gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + .75 gal = .75 gal x 3.785 L/gal = 2.85 L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
2.85	5.69	8.54	11.39	14.23

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

~~Monitoring Well~~ Piezometer PZ-04 (API)

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
12/15/08	1315	12.48	138	11.08	7.74	2.378	4.46	-13.4	>1000	.41
"	1320	15.41	"	10.60	7.55	2.413	8.74	-10.9	"	1.1
"	1325	17.70	"	10.84	7.32	2.462	8.32	2.1	"	1.8
"	1330	18.09	"	10.59	7.35	2.478	8.24	5.5	"	2.5
"	1335	18.90	"	9.95	7.23	2.458	7.87	8.6	"	3.2
"	1340	17.82	"	9.96	7.15	2.457	7.12	10.6	"	3.9
"	1345	17.50	"	10.00	7.14	2.460	7.10	10.8	"	4.55

Groundwater Sample Collected:

12/15/08	1345	17.50	138	10.00	7.14	2.460	7.10	10.8	>1000	4.55

Comments: Total Volume Removed: 4.55 L (Liter to gallons = _____ L x 0.264 gallons per liter = _____ L)

(Gallons to liters = _____ gal x 3.785 liters per gallon) = _____ Gal)

Collected FD & FS
(MW3005 & MW3013)

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB12508 AML

Location Code: ASH PIT 1-PZ04

Sample Number: ~~AP3003~~ WW3005

Sample Name: PBOW-08-GW-ASH PIT 1-PZ04-~~AP3003~~ WW 5

Sampling Method: PP

Sample Type: GW

Sample Purpose: ~~REG~~ MR FD

Sampling Equip: Peristaltic Pump / YSI 6820/Teflon Lined tubing

Task: 132288

Collection Date: 12/15/08

Collection Time: 1350

Start Depth: 20'

End Depth: 20'

Sample Matrix: WATER

Sample Team: D. Kessler M. Yantin / E. Weaver

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

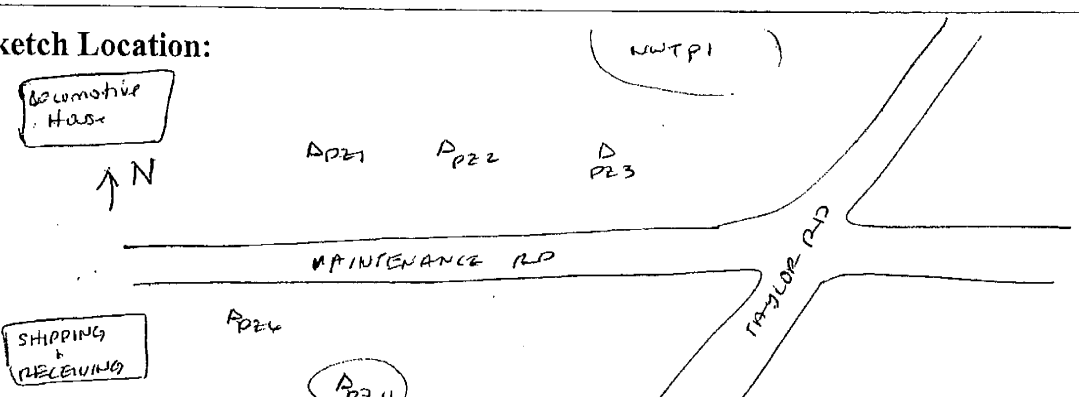
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE DKK
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 20.8' toc Depth To Water: 2.44' toc

Comments: Purge rate: 138 ml/min
Iron Hach Test: ~~0.0 mg/L~~ Not Measured (Turbidity > 1000 NTU)

Sketch Location:



Logged BY / Date: M. Yantin 12/15/08

Reviewed BY / Date: Edward K Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121508 AMC

Location Code: **ASH PIT 1-PZ04**

Sample Number: ~~AP3003~~ WW 3013 MR

Sample Name: **PBOW-08-GW-ASH PIT 1-PZ04-~~AP3003~~** WW3013 MR

Sampling Method: **PP**

Sample Type: **GW**

Sample Purpose: ~~REG~~ FS MR.

Sampling Equip: Peristaltic pump / YSI 6820

Task: **132288**

Collection Date: 12/15/08

Collection Time: 1350

Start Depth: 20'

End Depth: 20'

Sample Matrix: **WATER**

Sample Team: D. Kessler E-Weaver / M. Yantin

QC Partners:

(TB) — (ER) — (FB) —

ERPIMS Values:

Sacode:

Lot Control#:

Containers

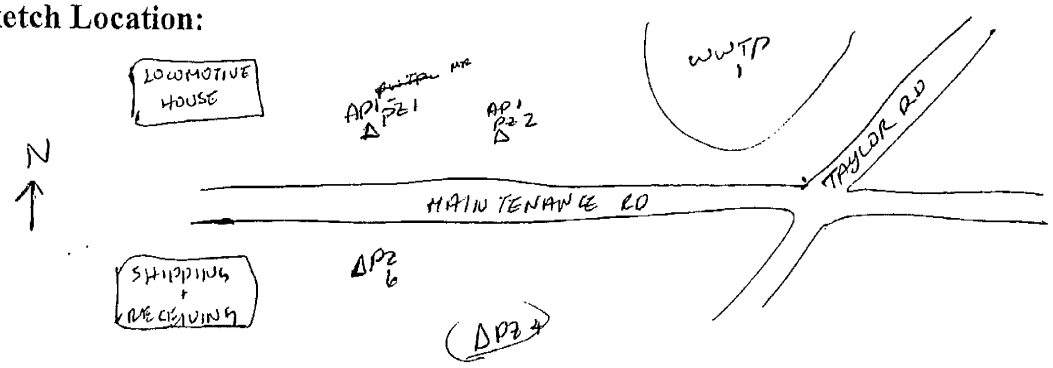
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

Groundwater Information:

Measured Well Depth: 20.8' toc **Depth To Water:** 2.44' toc

Comments: Purge rate: 138 mL/min
Iron Hach Test: ~~2.0 mg/L~~ Not Measured (Turbidity >1000 NTU)

Sketch Location:



Logged BY / Date: M. Yantin 12/15/08

Reviewed BY / Date: Edward E Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121608 AML

Location Code: **ASH PIT 1-PZ05**
Sample Number: **AP3004**
Sample Name: **PBOW-08-GW-ASH PIT 1-PZ05-AP3004**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Peristaltic Pump / YSI 6820 / Teflon-Lined Tubing

Task: **132288**
Collection Date: 12/16/08
Collection Time: 0910
Start Depth: 20'
End Depth: 20'
Sample Matrix: **WATER**
Sample Team: M. Yantin / D. Kosslow / E. Weaver

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
~~CHLORIDE~~	~~N~~	~~A~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
~~SULFATE~~	~~N~~	~~A~~	~~1~~	~~1~~	~~L~~	~~HDPE~~
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	~~2~~ 1	1	L	Amb. Glass
SEMIVOLATILES3	N	G	~~2~~ 1	1	L	Amb. Glass

stet

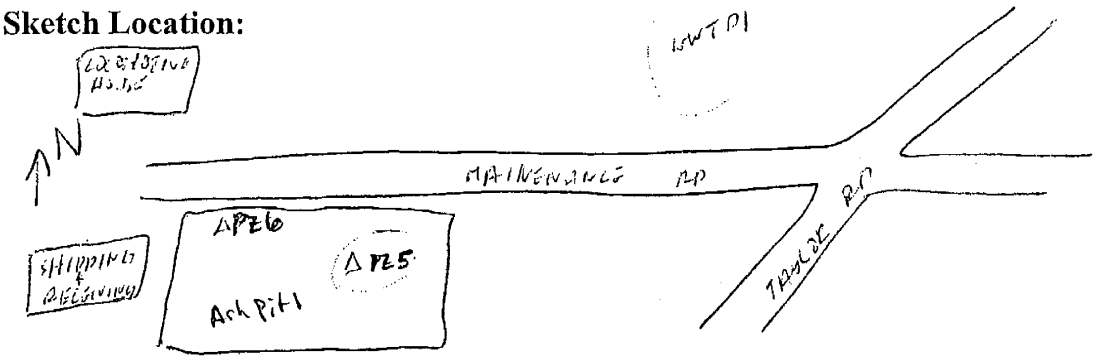
stet

Groundwater Information:

Measured Well Depth: 20.3' toc **Depth To Water:** 5.74' toc

Comments: Purge rate: 40 mL/min
Iron Hach Test Not Measured (Turbidity > 1000 NTU)

Sketch Location:



Logged BY / Date: M. Yantin 12/16/08 *Reviewed BY / Date:* Edward A. Weaver 1-20-09

GROUNDWATER SAMPLING FORM

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Sheet 1 of 2

Area or Site ID: **BWXT - Source Area**

Sampling location ID: API-12205
Sample ID: AP3004
Collection Time/Date: 12/16/08 0910

Weather: Cold 18° 29°

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: D. Kessler / H Yantin / E Weaver
Casing diameter (inches): 1
Total well depth (ft. BTOC): 20.2
Bladder Pump Settings: CPM NA
Refill (seconds): NA
Discharge (seconds): NA
Throttle (psi): NA
Discharge tube length (ft): 25'

Screen Interval (ft. BTOC): 10.2 to 20.2
Pump intake depth (ft BTOC): 20'
Max. sustainable pump rate (mL/min): _____
Appearance of product: NA No product _____
Discharge tube OD diameter (3/8" or 1/4"): _____
Inlet reducer used (Y/N): NO
PID reading: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.8 %;
Carbon: 0 ppm

Purging

Purging/sampling crew: D. Kessler / H. Yantin / E. Weaver
Purge date/beginning time: 12/16/08 0814
Initial (pre-purging) DTW (ft. BTOC): 8.74

Purge date/completion time: 12/16/08 0910
Final (post-purging) DTW (ft. BTOC): _____

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = 0.5 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft., (3/8" ID tubing) = 0.015 Liters/ft.

Tubing Length = 25 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (0.01 L/ftx ___ ft) + 0.5 L = NA L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (1)^2) = .041 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 11.46 ft x .041 Gal/ft = .46 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= (0.041 x ((_____)^2 - (_____)^2) = _____ gal/ft

Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%)
= ((Screen Height _____ ft + _____ ft) x _____ gal/ft) x 0.3 = _____ gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + .46 gal = .46 gal x 3.785 L/gal = _____ L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
1.78	3.55	5.33	7.11	8.88

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

~~Monitoring Well~~ AP1- P2 05

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
12/15/08	0819	12.21	109	7.42	6.93	1.019	3.04	92.8	>1000	.545
"	0824	16.43	"	7.07	6.88	1.032	1.43	46.1	>1000	1.09
"	0831	19.70	"	6.77	7.31	1.044	1.45	33.2	>1000	1.635
"	0836	20.1	46	6.35	8.02	1.034	5.75	49.8	>1000	1.631
"	0841	20.1	"	5.57	8.40	1.005	8.81	62.7	"	1.71
"	0846	20.2	45	5.11	8.65	0.982	10.66	71.2	"	1.77
"	0856	20.2	44	4.84	8.94	0.964	11.58	76.3	"	1.86
0910	12/15/08	20.2	46	4.32	10.76	0.903	13.04	83.0	>1000	2.42

NM 12/16/08

Groundwater Sample Collected:

~~NO SAMPLE HR~~

Comments: Total Volume Removed: 2.42 L (Liter to gallons = _____ L x 0.264 gallons per liter = _____ L)

(Gallons to liters = _____ gal x 3.785 liters per gallon) = _____ Gal)

~~Well not sampled HR.~~ Well sampled

Recharge : 45mL/min

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: NA

Location Code: **ASH PIT 1-PZ06**
Sample Number: **AP3005**
Sample Name: **PBOW-08-GW-ASH PIT 1-PZ06-AP3005**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Peristaltic pump/ YSI 6820

Task: **132288**
Collection Date: 12/15/08
Collection Time: NA
Start Depth: 20
End Depth: 20'
Sample Matrix: **WATER**

QC Partners:
(TB) — (ER) — (FB) —

Sample Team: HY/DK/FW

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass

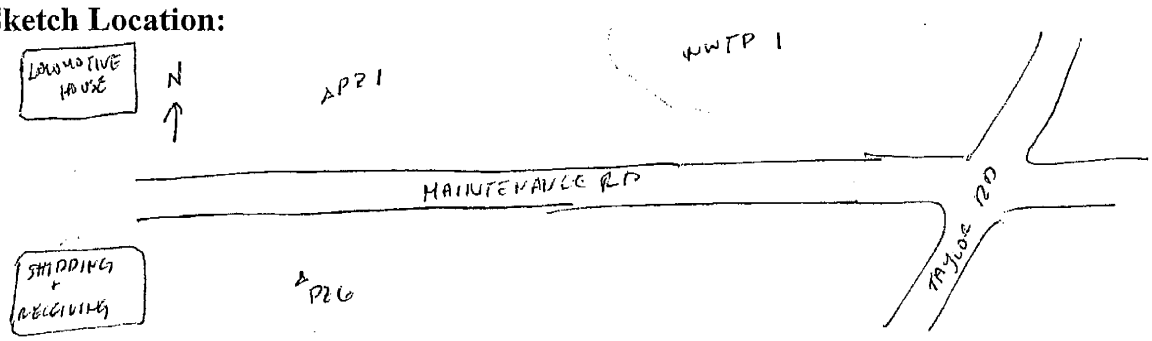
Well Not Sampled

Groundwater Information:

Measured Well Depth: 20.2' toc **Depth To Water:** 2.44' toc

Comments: Purge rate 100 mL/min
Iron Hach Test: NA
Could not sample because of no low-flow/slow recharge

Sketch Location:



Logged BY / Date: H Yartin 12/15/08 *Reviewed BY / Date:* Edward C Mew 1-20-09

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: **BWXT - Source Area**

Sampling location ID: APD1 - D26

Sample ID: ~~to~~ AP 3005

Weather: Cold 29°

Collection Time/Date: 12/5/08 NA

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____) (circle or add one)

Pump installation crew: D. Kessler / H. Yantin / E. Weaver

Casing diameter (inches): 1

Total well depth (ft. BTOC): 20.2' toc

Bladder Pump Settings: CPM NA

Refill (seconds): NA

Discharge (seconds): NA

Throttle (psi): NA

Discharge tube length (ft): 25'

Screen Interval (ft. BTOC): 10.2' to 20.2'

Pump intake depth (ft BTOC): 20'

Max. sustainable pump rate (mL/min): 160 mL/min

Appearance of product: NA No product_____

Discharge tube diameter (3/8" or 1/4"): _____

Inlet reducer used (Y/N): No

PID reading: 4.7 ppm

LEL: LEL: 0 %; Oxygen: 20.8 %;

Carbon: 0 ppm

H_2S: 0

Purging

Purging/sampling crew: D. Kessler / H. Yantin / E. Weaver

Purge date/beginning time: 12/15/08

Initial (pre-purging) DTW (ft. BTOC): 2.44' toc

Purge date/completion time: 12/15/08 1056

Final (post-purging) DTW (ft. BTOC): dry

Low Flow purge tubing volume calculations:

Volume of Water in Tubing:

Bladder pump volume = 0.5 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft., (3/8" ID tubing) = 0.015 Liters/ft.

Tubing Length = 25 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing Length) + Pump Volume = (0.01 L/ftx____ft) + 0.5 L = NA L

Minimum no. of tubing volumes to purge: NA

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = NA L x NA = NA L

Monitoring well purge volume calculations:

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (1)^2) = .041 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 17.76 ft x .041 Gal/ft = .728 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= (0.041 x ((_____)^2 - (_____)^2) = _____ gal/ft

Filter Pack Volume (gal) = ((Screen Height + lesser of 2 ft or water column) x gal/ft) x porosity (30%)

= ((Screen Height _____ft + _____ft) x _____gal/ft) x 0.3 = _____gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 0 gal + .728 gal = .728 gal x 3.785 L/gal = 2.76 L

1 x Well Volume	2 x Well Volume	3 x Well Volume	4 x Well Volume	5 x Well Volume
2.76	5.51	8.26	11.02	13.77

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

~~Monitoring Well~~ API - PZ06

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Temp. (C°)	pH (SU)	Electrical Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Cumulative Volume Purged (L)
8/15/08	1050	9.59	180	10.07	9.26	2.296	6.19	7.9	7.000	.90
"	1055	14.25	"	10.33	8.57	2.390	1.24	-32.5	71000	1.8
"	1102	well	is	dry						2.9

Well Not Sampled Very slow Recharge

DHK

Groundwater Sample Collected:

NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Comments: Total Volume Removed: 2.9 L (Liter to gallons = _____L x 0.264 gallons per liter = _____L)
(Gallons to liters = _____ gal x 3.785 liters per gallon) = _____ Gal)

changed purge rate to 100 mL/min @ 1056

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; mL - milliliter; L - Liter; Gal - Gallon

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB121208AML

Location Code: FIELDQC
Sample Number: 122008-1
Sample Name: PBOW-08-GW-122008-1
Sampling Method: PP
Sample Type: GW *Sample Purpose:* FB
Sampling Equip: NA

Task: 132288
Collection Date: 12/12/08
Collection Time: 1200
Start Depth: NA
End Depth: NA
Sample Matrix: WATER
Sample Team: M. Yantin

QC Partners:
(TB) 122008-3 (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass
VOLATILES3	N	H	3	40	mL	VOA VIAL

Groundwater Information:
Measured Well Depth: NA **Depth To Water:** NA

Comments: Field QC collected with DI water (Lot #38786) from Environmental Equipment & Supply. Collected at ATS Building.

Sketch Location: NA

Logged BY / Date: M. Yantin 12/12/08 *Reviewed BY / Date:* Edward E. Weaver 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PBOW 121208-AML

Location Code: **FIELDQC**
Sample Number: **122008-2**
Sample Name: **PBOW-08-GW-122008-2**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **FB**
Sampling Equip: NA

QC Partners:
(TB) 122008-3 (ER) — (FB) —

Task: **132288**
Collection Date: 12/12/08
Collection Time: 1355
Start Depth: NA
End Depth: NA
Sample Matrix: **WATER**
Sample Team: D. Kessler / M. Yasin

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
ALKALINITY	N	A	1	1	L	HDPE
CHLORIDE	N	A	1	1	L	HDPE
SULFATE	N	A	1	1	L	HDPE
TDS	N	A	1	1	L	HDPE
TSS	N	A	1	1	L	HDPE
TURB 180.1	N	A	1	1	L	HDPE
HARDNESS	N	B	1	500	mL	HDPE
METALS3-W	N	B	1	500	mL	HDPE
METALS3-W-F	Y	C	1	500	mL	HDPE
CYANIDE	N	D	1	500	mL	HDPE
NITRATE	N	E	1	125	mL	HDPE
EXPLOSIVES	N	F	2	1	L	Amb. Glass
SEMIVOLATILES3	N	G	2	1	L	Amb. Glass
VOLATILES3	N	H	3	40	mL	VOA VIAL

Groundwater Information:
Measured Well Depth: NA **Depth To Water:** NA

Comments: Source water, FB, collected from Firehose at guard house. Water purged from line ~2 min prior to sample collection. Emptied water from Firehose into ~~approx~~ appropriate sample bottle.

Sketch Location:

Logged BY / Date: David Kessler 12/12/08 *Reviewed BY / Date:* Edward E. Meier 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB 121208 AML

Location Code: **FIELDQC**
Sample Number: **122008-4 DKK**
Sample Name: **PBOW-08-GW-122008-4 DK**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* ER DKK
Sampling Equip: Stainless Steel Spoon

Task: **132288**
Collection Date: 12/12/08
Collection Time: 1245
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: D. Kessler / M. Gunderson

QC Partners:
(TB) — (ER) — (FB)

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
~~ALKALINITY~~	N	A	1	1	L	~~HDPE~~
~~CHLORIDE~~	N	A	1	1	L	~~HDPE~~
SULFATE	N	A	1	1	L	HDPE
~~TDS~~	N	A	1	1	L	~~HDPE~~
TSS	N	A	1	1	L	HDPE
~~TURB 180.1~~	N	A	1	1	L	~~HDPE~~
HARDNESS	N	B	1	500	mL	HDPE
~~METALS3-W~~	N	B	1	500	mL	~~HDPE~~
~~METALS3-W-F~~	Y	C	1	500	mL	~~HDPE~~
CYANIDE	N	D	1	500	mL	HDPE
~~NITRATE~~	N	E	1	125	mL	~~HDPE~~
EXPLOSIVES	N	F	2	1	L	Amb. Glass
~~SEMIVOLATILES3~~	N	G	2	1	L	~~Amb. Glass~~
~~VOLATILES3~~	N	H	3	40	mL	VOA VIAL

only analyte

ERPIMS Values:
Sacode:
Lot Control#:

Groundwater Information:
Measured Well Depth: — **Depth To Water:** —

Comments: Poured ASTM D1 water over stainless steel spoon into appropriate bottle. Spoon used to last collect soil sample during sewer line investigation.

Sketch Location: Spoon only source for field blank sample during investigation. All other items used once then disposed (ie. teflon-lined tubing, zip-lock baggies for homogenization).

Logged BY / Date: David Kessler 12/12/08 *Reviewed BY / Date:* Edward K. Mear 1-20-09

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Sample Collection Log

843656 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PBOW 12/2008-AML

Location Code: **FIELDQC**
Sample Number: **122008-3**
Sample Name: **PBOW-08-GW-122008-3**
Sampling Method: **PP**
Sample Type: **GW** *Sample Purpose:* **TB**
Sampling Equip: —

Task: **132288**
Collection Date: 12/12/08
Collection Time: —
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: MY

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES3	N	H	~~3~~ 2	40	mL	VOA VIAL

ERPIMS Values:
Sacode:
Lot Control#:

Groundwater Information:
Measured Well Depth: _____ **Depth To Water:** _____

Comments:

Sketch Location:

TRIP

Logged BY / Date: David Kersh 12/12/08 *Reviewed BY / Date:* Edward E. Mew 1-20-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052009-ACCT

Location Code: AP1-SW01
Sample Number: AP2007
Sample Name: PBOW-09-SW-AP1-SW01-AP2007-REG
Sampling Method: GRAB
Sample Type: SW *Sample Purpose:* REG
Sampling Equip: Sample bottle submerging

Task: ASH PIT1 & 3
Collection Date: 5/19/09
Collection Time: 1700
Start Depth: 0 Ft
End Depth: 0.5 Ft
Sample Matrix: WATER
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

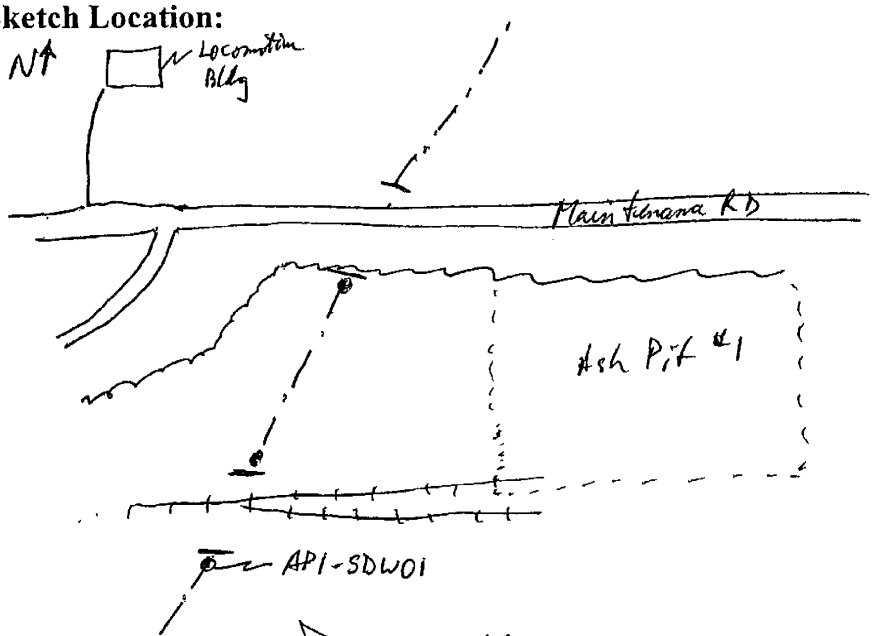
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass
METALS3-W-F	N	B	1	500	mL	HDPE
SEMIVOLATILES3	N	C	2	1	L	Amb. Glass
PCB3	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	32.5	7.05	1.103	9.4	4.73	15.08

Comments: Sample collected by submerging sample bottles, Metals bottle filled from nitros.

Sketch Location:



Logged BY / Date: David Kresch 5/19/09 *Reviewed BY / Date:* Edward Mann 11-11-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 051909 ACCT

Location Code: **AP1-SW02**
Sample Number: **AP2008**
Sample Name: **PBOW-09-SW-AP1-SW02-AP2008-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Sample Bottles

Task: **ASH PIT1 & 3**
Collection Date: 5/19/09
Collection Time: 1400
Start Depth: 0 Ft
End Depth: 0.5 Ft
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

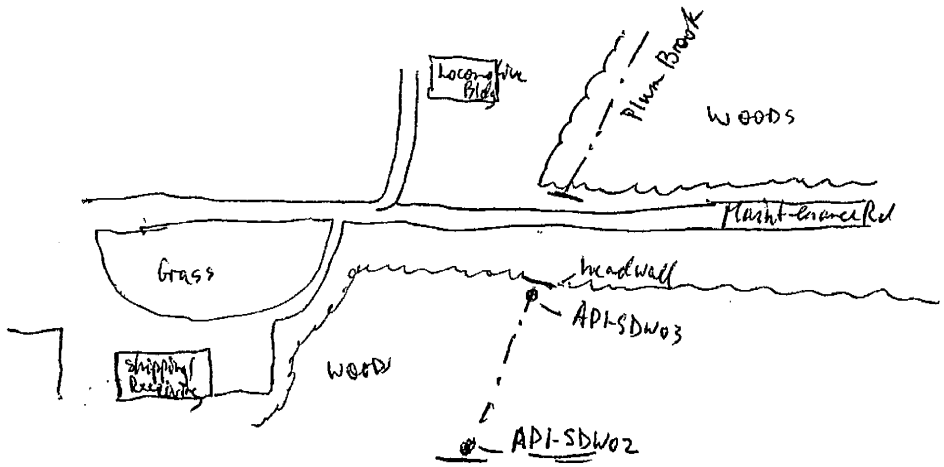
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass
METALS3-W	N	B	1	500	mL	HDPE
SEMIVOLATILES3	N	C	2	1	L	Amb. Glass
PCB3	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	51.9	7.10	1.046	0.0	6.65	13.19

Comments: Sample Bottles submerged for collection. Preserved metals filled w/ non-preserved nitroaromatics bottle

Sketch Location:

N↑



Logged BY / Date: David Kessler 5/19/09 *Reviewed BY / Date:* Edward [illegible] 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW051909 ACCT

Location Code: **AP1-SW03**
Sample Number: **AP2012**
Sample Name: **PBOW-09-SW-AP1-SW03-AP2012-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Sample Bottles

Task: **ASH PIT1 & 3**
Collection Date: 5-19-09
Collection Time: 1045
Start Depth: 0 ft
End Depth: 0.5 ft
Sample Matrix: **WATER**
Sample Team: DKK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

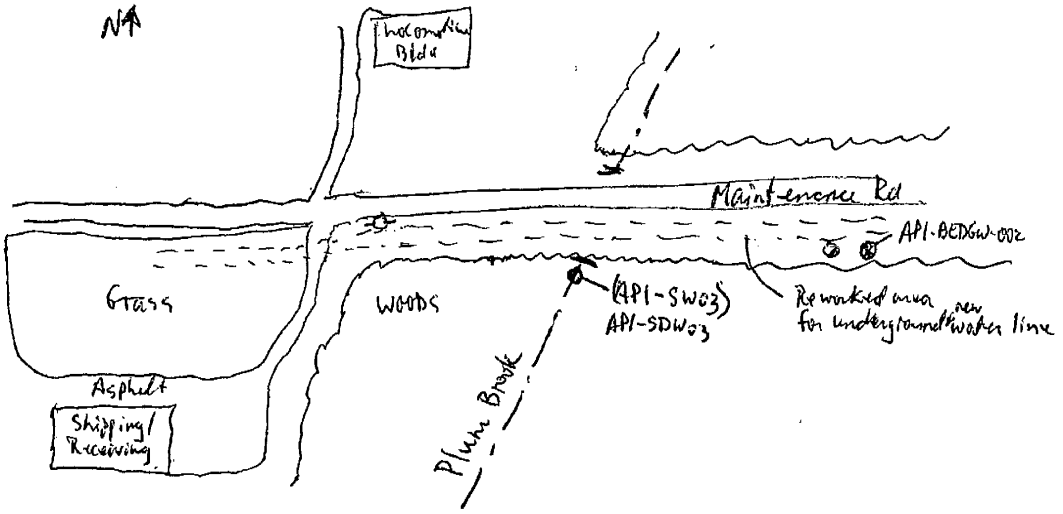
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass
METALS3-W-F	N	B	1	500	mL	HDPE
SEMIVOLATILES3	N	C	2	1	L	Amb. Glass
PCB3	N	D	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	175.7	6.78	1.052	1.3	7.77	12.64

Comments: For Collection: Submerged bottle in water. For metal sample, bottle filled from nitro bottle.

Sketch Location:



Logged BY / Date: David Kresch 5/19/09 *Reviewed BY / Date:* Edward W Sawan 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052009-ACCT

Location Code: **AP1-SW04**
Sample Number: **AP2013**
Sample Name: **PBOW-09-SW-AP1-SW04-AP2013-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Sample Bottle Submerging

Task: **ASH PIT1 & 3**
Collection Date: 5-20-09
Collection Time: 0830
Start Depth: 0.0 ft
End Depth: 0.5 ft
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

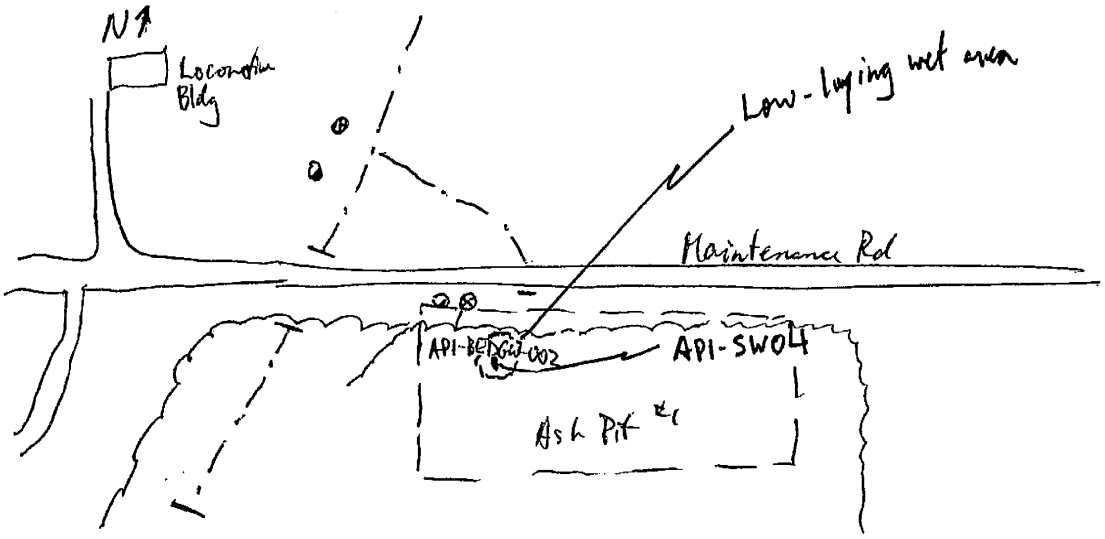
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass
METALS3-W-F	N	B	1	500	mL	HDPE
SEMIVOLATILES3	N	C	2	1	L	Amb. Glass
PCB3	N	D	2	1	L	Amb. Glass

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	215.1	7.12	1.295	18.0	7.20	12.43

Comments:

Sketch Location:



Logged BY / Date: David Kesh 5/20/09 *Reviewed BY / Date:* Edward S. Weaver 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB05~~20~~09-ACCT (DIRK)

Location Code: **AP1-SD01**
Sample Number: **AP1007**
Sample Name: **PBOW-09-SD AP1-SD01-AP1007-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: Disposable nitrile glove, zip-lock bag to composite

Task: **ASH PIT1 & 3**
Collection Date: 5/19/09
Collection Time: 1715
Start Depth: 0.2 ft
End Depth: 0.7 ft
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM
METALS3	N	C	1	4	oz	CWM
SEMIVOLATILES3	N	D	1	4	oz	CWM
TOC-B	N	E	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0-0.2 Ft green, black moss, sticks, organics
0.2-0.7' Sediment brown to black in color, wet silty CLAY

Sketch Location:

See AP2007 for sketch

Logged BY / Date: David Kesh 5/19/09 *Reviewed BY / Date:* Edward G Weaver 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW051909ACCT

Location Code: **AP1-SD02**
Sample Number: **AP1008**
Sample Name: **PBOW-09-SD AP1-SD02-AP1008-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile gloves, zip-lock bag composite

QC Partners:
(TB) — (ER) — (FB) —

Task: **ASH PIT1 & 3**
Collection Date: 5/19/09
Collection Time: 1425
Start Depth: 0.2 ft
End Depth: 0.7 ft
Sample Matrix: **SOIL**
Sample Team: DK/BT

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM
METALS3	N	C	1	4	oz	CWM
SEMIVOLATILES3	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.2 ft weeds/moss/roots overlying sediment

Sketch Location:

See AP2008 for sketch (collated surface water)

Logged BY / Date: David Kresh 5/19/09 *Reviewed BY / Date:* Edward Wawe 11-11-1

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB051909 ACCT

Location Code: **AP1-SD03**
Sample Number: **AP1012**
Sample Name: **PBOW-09-SD AP1-SD03-AP1012-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: Nitrile glove grab, ziplock bag composite

Task: **ASH PIT1 & 3**
Collection Date: 5/19/09
Collection Time: 1110
Start Depth: 18" ~~0 (top of sed)~~
End Depth: 24" ~~0.5 ft~~
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM
METALS3	N	C	1	4	oz	CWM
SEMIVOLATILES3	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Grabbed 0.5 ft sediment from surface, placed into new zip-lock bag, composited sample, and filled sample jars.
0-18" Black, weeds, organics. Sediment estimated 18"-24"

Sketch Location:

See AP2012 for sketch (surface water)

Logged BY / Date: David Kresl 5/19/09 *Reviewed BY / Date:* Edward [illegible] 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052009-ACCT

Location Code: **AP1-SD04**
Sample Number: **AP1013**
Sample Name: **PBOW-09-SD AP1-SD04-AP1013-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab, new zip-lock bag composite

Task: **ASH PIT1 & 3**
Collection Date: 5/20/09
Collection Time: 0855
Start Depth: 0.2 ft
End Depth: 0.7 ft
Sample Matrix: **SOIL**
Sample Team: DC/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM
METALS3	N	C	1	4	oz	CWM
SEMIVOLATILES3	N	D	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Removed 0.2 ft ~~scraped over~~ removed OKK slough (sticks, roots), 0.2-0.7; Sample Black, silty, SAND, fine to coarse grain, wet

Sketch Location:

See AP1-SW04

Logged BY / Date: David Keesh 5/20/09 *Reviewed BY / Date:* Edward C Weaver 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB0526 09-ACCT

Location Code: **AP3-SW01**
Sample Number: **AP2009**
Sample Name: **PBOW-09-SW-AP3-SW01-AP2009-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: ~~Niskin~~ submerged sample bottle

Task: **ASH PIT1 & 3**
Collection Date: 5-23-09
Collection Time: 1640
Start Depth: 0.0 ft
End Depth: 0.3 ft
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

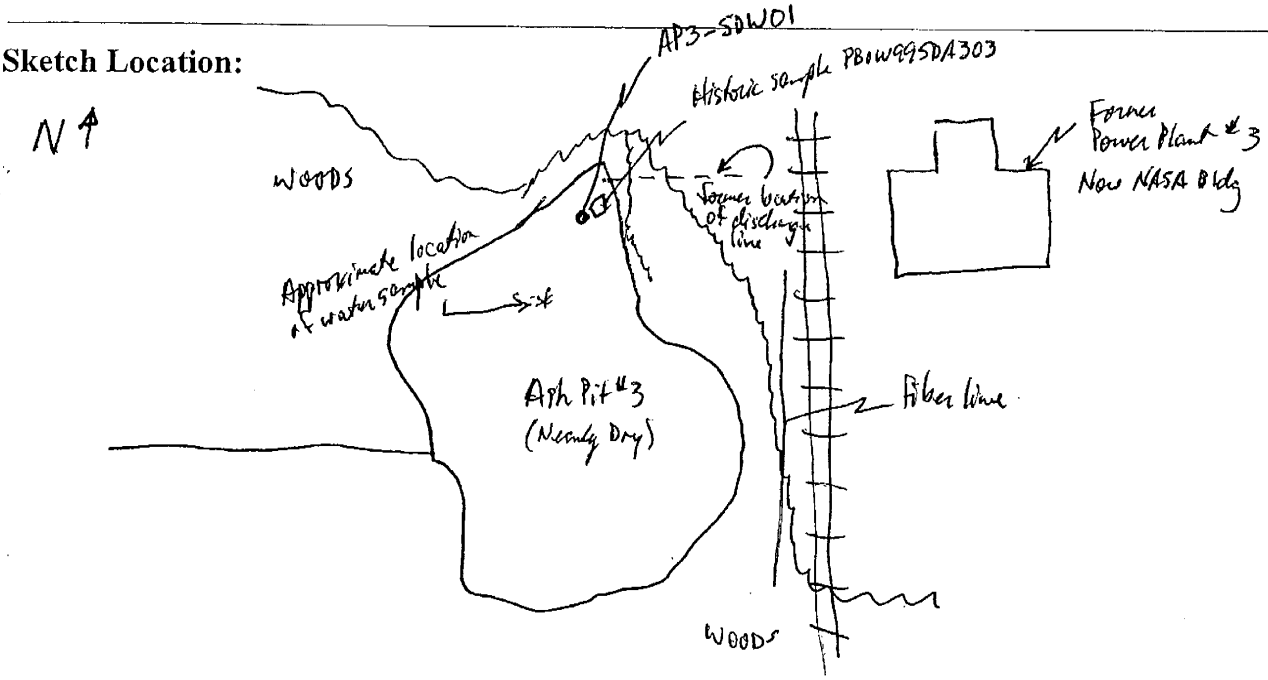
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	-107.9	6.63	0.712	109.1	1.04	25.22

Comments: GPS Coordinates: Waypt 017 N: 41.37677 ft, W: 082.69647 ft
ele: 657 ft

Sketch Location:



Logged BY / Date: David Krish 5/23/09 *Reviewed BY / Date:* Edward [illegible] 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP3-SW02**
Sample Number: **AP2010**
Sample Name: **PBOW-09-SW-AP3-SW02-AP2010-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged Sample bottles

Task: **ASH PIT1 & 3**
Collection Date: 5/23/09
Collection Time: 1715
Start Depth: 0.0 ft
End Depth: 0.3 ft
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

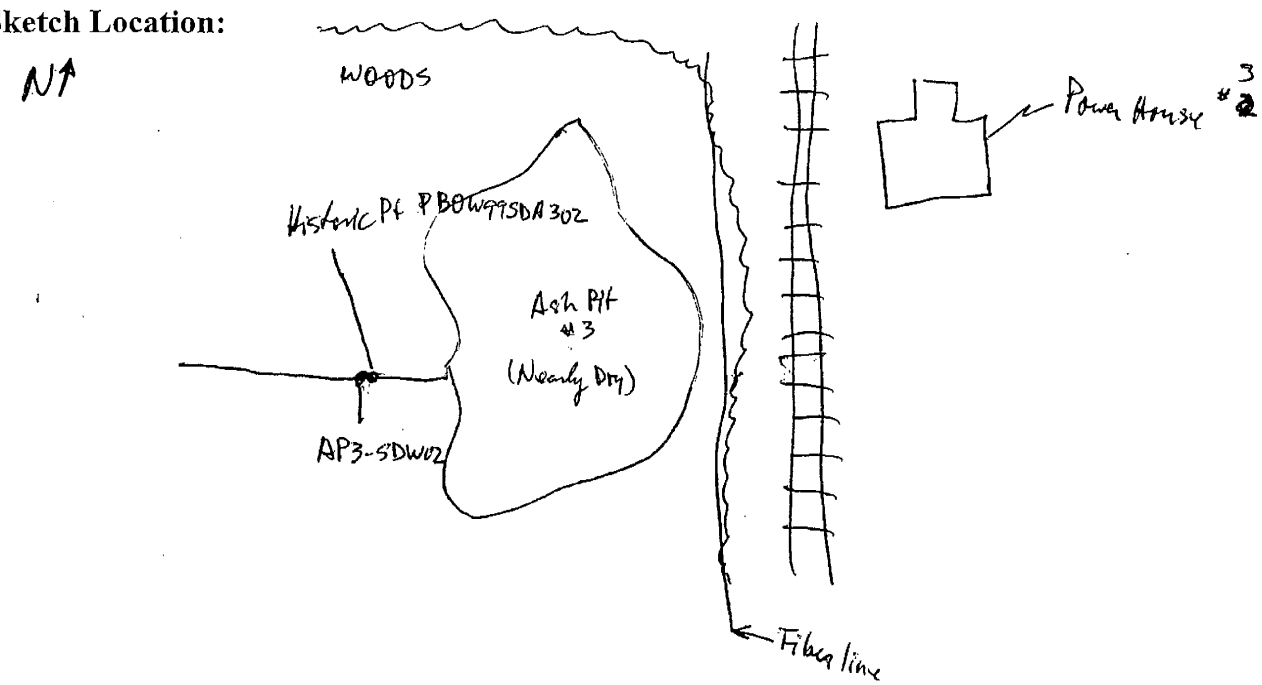
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	-79.8	6.66	0.712	6.8	2.99	19.83

Comments: Many dead trees in ditch

Sketch Location:



Logged BY / Date: David Keesh 5/23/09 *Reviewed BY / Date:* Edward Kenner 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

PB052709-ACCT

RFA / COC Number: ~~PB052609-ACCT~~ e DKK

Location Code: **AP3-SW03**
Sample Number: **AP2011**
Sample Name: **PBOW-09-SW-AP3-SW03-AP2011-REG**
Sampling Method: **GRAB**
Sample Type: **SW** *Sample Purpose:* **REG**
Sampling Equip: Submerged sample bottle

Task: **ASH PIT1 & 3**
Collection Date: ~~5/23/09~~ 5/27/09
Collection Time: DKK ~~1740~~ 1310
Start Depth: 0.0'
End Depth: 0.3'
Sample Matrix: **WATER**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

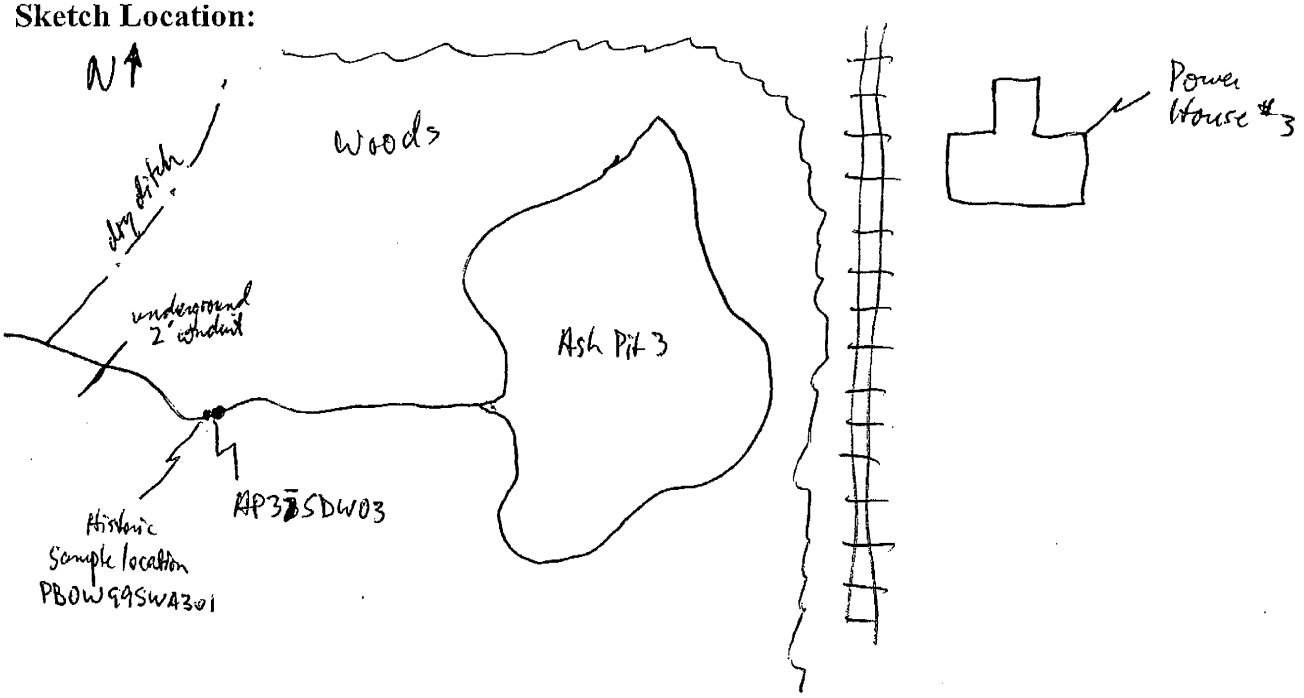
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	1	L	Amb. Glass

ERPIMS Values:
Sacode:
Lot Control#:

Surface Water Parameters:	Eh (mV)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DissOxygen (ppm)	Temperature (C)
	-80.8	6.83	0.768	195.1	3.25	20.67 ← 5/23/09 measurement

Comments: Found no historic sample location stakes.
- Received report from lab that both bottles received broken ∴ Recollected 1L on burst bottles on 5/27/09.

Sketch Location:



Logged BY / Date: David Kressler 5/23/09 *Reviewed BY / Date:* Edward S. Mawer 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP3-SD01**
Sample Number: **AP1009**
Sample Name: **PBOW-09-SD AP3-SD01-AP1009-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab, zip-lock bag composite

Task: **ASH PIT1 & 3**
Collection Date: 5/23/09
Collection Time: 1650
Start Depth: ~~0.5 Ft~~ 0.0 Ft
End Depth: 0.5 Ft
Sample Matrix: **SOIL**
Sample Team: DK/BT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM
METALS3	N	C	1	4	oz	CWM
SEMIVOLATILES3	N	D	1	4	oz	CWM
TOC-B	N	E	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Removed leaves, sticks; 0.0 - 0.5 Ft; very dark br, vfg, sandy SILT, very moist

Sketch Location:

See SW SCL AP2009 for sketch

Logged BY / Date: David Kesel 5/23/09 *Reviewed BY / Date:* Edward [illegible] 11-11-09

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP3-SD02**
Sample Number: **AP1010**
Sample Name: **PBOW-09-SD AP3-SD02-AP1010-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab

Task: **ASH PIT1 & 3**
Collection Date: 5/23/09
Collection Time: 1725
Start Depth: 0.1 Ft
End Depth: 0.6 Ft
Sample Matrix: **SOIL**
Sample Team: DSK/BJT

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: 0.0-0.1 Ft Removed bark, leaves.
0.1-0.6 Ft: Black, SILT, organics (trace), moist

Sketch Location:

See SW SCL AP2010 for sketch

Logged BY / Date: David Kessler 5/23/09 *Reviewed BY / Date:* Edward K. Nawrocki 11-11-0

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB052609-ACCT

Location Code: **AP3-SD03**
Sample Number: **AP1011**
Sample Name: **PBOW-09-SD AP3-SD03-AP1011-(0-0.5)-REC**
Sampling Method: **GRAB**
Sample Type: **SD** *Sample Purpose:* **REG**
Sampling Equip: nitrile glove grab, zip lock bag composite

Task: **ASH PIT1 & 3**
Collection Date: 5/23/09
Collection Time: 1745
Start Depth: 0.0 Ft
End Depth: 0.5 Ft
Sample Matrix: **SOIL**
Sample Team: DK/BF

QC Partners:
(TB) — (ER) — (FB) —

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
PCB3	N	B	1	4	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: sample: Brownish gray, very soft, clayey SILT, wet

Sketch Location:

See SW SCL AP2011 for sketch

Logged BY / Date: David Kosch 5/23/09 *Reviewed BY / Date:* Edward [illegible] 11-11-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-050709-IACCT

Location Code: AP1-MW01
Sample Number: AP3050
Sample Name: PBOW-09-GW-AP1-MW01-AP3050-REG
Sampling Method: ~~GRAB~~ LF MR
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: YSI 6820 / Bladder pump

Task: TPAPLBRC
Collection Date: 5/7/09
Collection Time: 1440
Start Depth: 13.5' btoc
End Depth: 13.5 btoc
Sample Matrix: WATER

QC Partners:
(TB) 050809-TB (ER) — (FB) —

Sample Team: M. Yantin / E. Weaver

ERPIMS Values:
Sacode:
Lot Control#:

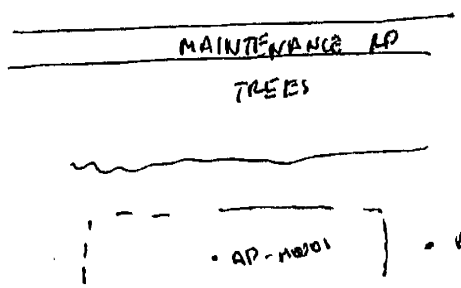
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	~~2~~ 1 MR	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 19.35' btoc **Depth To Water:** 6.1' btoc

Comments: Setting for low flow is 29 refill / 1sec discharge.
LEL: 0 PID: 0 CO: 0 H_2S: 0 O_2: 20.9
Hach Test: 4.0 mg/L

Sketch Location:



Equipment	S/N
YSI 6820	28821
water meter	LVE 002476
well wizard	LVE 002731
MP 10	LVE 002725
LEL METER	56928

Logged BY / Date: M. Yantin 5/7/09 *Reviewed BY / Date:* Edward Weaver 11-11-0

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3050
Weather: Rain 65°

Sampling location ID: API-MW01
Collection Time/Date: 5/7/09 1440

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other _____ (circle or add one)

Pump installation crew: M. Yantin / S. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 19.35
Bladder pump settings: CPM 2
Refill (seconds): 29
Discharge (seconds): 1
Throttle (psi): 20
Discharge tube length (ft.): 19

Screen Interval (ft. BTOC): 12.4 to 22.4
Pump intake depth (ft BTOC): 13.5
Max. sustainable pump rate (mL/min): _____
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Yantin / S. Weaver
Purge date/beginning time: 5/7/09 1405
Initial (pre-purging) DTW (ft. BTOC): 5.16

Purge date/completion time: 5/7/09 1440
Final (post-purging) DTW (ft. BTOC): 6.1

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. — 0.02 L for a 3/8" I.D. tube
Tubing length = 19 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 19 ft) + 0.3 L = .49 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .49 L x 3 = 1.47 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 14.19 ft x .164 Gal/ft = 2.32 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((_____)^2 - (_____)^2) = _____ gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height_____ft + _____ft) x _____gal/ft) x 0.3 = _____gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = _____ gal + _____ gal = _____ gal X 3.785 L/gal = _____ L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.094	.096							

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/7/09	1425	6.1	.094	.94	11.15	1.759	-14.3	6.56	1.93	25.6
"	1430 ~~1500~~	6.1	.096	1.92	11.16	1.758	-13.9	6.57	1.89	27.3
"	1435 ~~1505~~	6.1	.096	1.9 ~~2.86~~	11.21	1.754	-13.2	6.59	1.85	18.1
"	1435 ~~1510~~	6.1	.096	2.38	11.18	1.751	-13.8	6.55	1.85	10.3
"	1440 ~~1515~~	6.1	.096	2.86	11.16	1.750	-13.7	6.56	1.85	10.5

MKY
5/7/09

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

MKY
5/7/09

Sampling

Sampling beginning time: 1440 Sampling completion time: 1600

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/7/09	1440	6.1	~~2.86~~ 0.86	2.86	11.16	1.750	-13.7	4.54	1.85	10.5

Sample Information

Sample ID: AP 3050
Duplicate sample collected (Y/N): N
Split sample collected (Y/N): N

Sample collection date/time: 5/7/09 1440
Duplicate sample ID: NA
Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
VOCs		3 VOA vials	Alkalinity		1L HDPE
Explosives /SVOCs		1L Ambers			
Metals		500 mL HDPE			
Nitrate		"			
Cyanide		"			

Comments: Settings @ beginning were 25/5. Switched to 29/1 and DTW stabilized @ 6.1 ft btoc. Iron Hach Test: 4 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 · PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 051009 - ACCT

Location Code: **AP1-MW02**
Sample Number: **AP3051**
Sample Name: **PBOW-09-GW-AP1-MW02-AP3051-REG**
Sampling Method: ~~GRAB~~ BA
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bailer / YSI 6820

Task: **TPAPLBRC**
Collection Date: 5/10/09
Collection Time: 0810
Start Depth: 19.1' btoc
End Depth: 23.3' btoc
Sample Matrix: **WATER**
Sample Team: G. Weaver / M. Yantin

QC Partners:
(TB) 051109-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

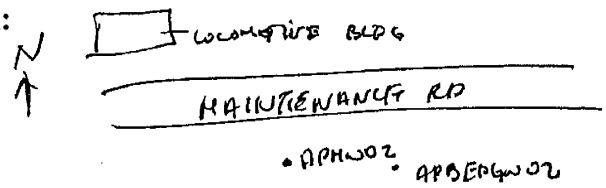
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 23.32' btoc **Depth To Water:** 19.1' btoc

Comments: Sample collected by bailer. Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yantin / 5/10/09 *Reviewed BY / Date:* Edward Allen 11-11-09

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3051
Weather: cloudy / windy 65°

Sampling location ID: API-MW 02
Collection Time/Date: 5/10/09 0810

Pump Installation Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: E. Weaver / M. Yantin
Casing diameter (inches): 2
Total well depth (ft. BTOC): 23.35
Bladder pump settings: CPM 2-1-4
Refill (seconds): 29-59-10
Discharge (seconds): 1-1-5
Throttle (psi): 20-20-35
Discharge tube length (ft.): 23

Screen Interval (ft. BTOC): 12.4 to 22.4
Pump intake depth (ft BTOC): 17.6
Max. sustainable pump rate (mL/min): NA
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm
LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon 0 ppm

Purging

Purging/sampling crew: E. Weaver / M. Yantin
Purge date/beginning time: 5/9/09 1002
Initial (pre-purging) DTW (ft. BTOC): 4.13

Purge date/completion time: 1158
Final (post-purging) DTW (ft. BTOC): DRY

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = _____ ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = _____ L
No. of tubing volumes purged: _____
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

MRY 5/19/09

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 19.22 ft x .164 Gal/ft = 3.15 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10 ft + ~~2.46~~ 2.00 ft) x 2.46 gal/ft) x 0.3 = 8.86 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 3.15 gal + 8.86 gal = 12.0 gal X 3.785 L/gal = 45.4 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
45.4	90.88	136.33	181.7	227.21

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.030	.015	.272	.40	.42	.50	—	—	.50

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/9/09	1022	4.53	.03	.6	17.02	1.997	-320.5	6.74	4.53	0.0
"	1032	4.79	.015	.75	17.36	1.991	-390.6	6.73	4.80	0.0
"	1037	NA	.260	2.05	12.84	2.029	-388.8	6.71	3.00	0.0
"	1042	NA	.272	3.41	12.81	2.015	-392.1	6.71	2.87	0.0
"	1047	11.00	.272	4.8	12.76	2.010	-395.0	6.70	2.80	0.0
"	1052	12.00	.272	6.13	12.70	2.008	-394.8	6.71	2.79	0.0
"	1053	NA	.040	8.13	—	NO READING				
"	1058	NA	.42	10.23	—	NO READING				
"	1103	NA	.50	12.73	—	NO READING				

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/9/09	1203	DRY	~~47.73~~ NA	47.73	NO READINGS					
5/10/09	0810	19.1	0.5	47.73	11.80	2.011	-320.8	6.75	9.82	00

MRG 5/9/09

Sampling

Sampling beginning time: 0810 Sampling completion time: 0842

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/10/09	0810	19.1	NA	47.73	11.80	2.011	-320.8	6.75	9.82	00

Sample Information

Sample ID: AP3051

Sample collection date/time: 5/10/09 0810

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

MRG 5/10/09

Comments: Well cannot be low-flowed. At the lowest purge @ 59/1 (1 GPM) water level is dropping. Sample collected by bailer

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 05 07 09 -ACCT

Location Code: AP1-MW03
Sample Number: AP3052
Sample Name: PBOW-09-GW-AP1-MW03-AP3052-REG
Sampling Method: ~~GRAB~~ MR
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: ~~Blac~~ MR Bailer /451 6820

Task: TPAPLBRC
Collection Date: 5/11/09
Collection Time: 0755
Start Depth: 18.4' btoc
End Depth: 21.87' btoc
Sample Matrix: WATER

QC Partners:
(TB) 051109 -TB (ER) — (FB) —

Sample Team: E. Weaver / M. Yantin

ERPIMS Values:
Sacode:
Loi Control#:

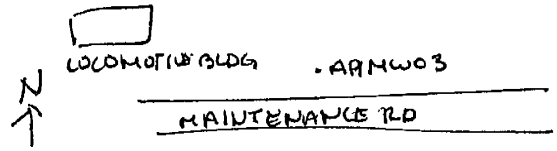
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 21.87' btoc **Depth To Water:** 18.4' btoc

Comments: Sample collected by bailer. Not enough water available for an entire sampling suite.

Sketch Location:



Logged BY / Date: M. Yantin 5/11/09 *Reviewed BY / Date:* Edward E. Weaver 11-11-0

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3052
Weather: Sunny 55°

Sampling location ID: AP1MW03
Collection Time/Date: 5/11/09 0755

Pump Installation (Bladder)/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: E. Weaver / M. Yantin
Casing diameter (inches): 2
Total well depth (ft. BTOC): 21.87
Bladder pump settings: CPM 2-2-1
Refill (seconds): 25-29-59
Discharge (seconds): 5-1-1
Throttle (psi): 20-20-20
Discharge tube length (ft.): 22

Screen Interval (ft. BTOC): 11.87 to 21.87
Pump intake depth (ft BTOC): 16.5
Max. sustainable pump rate (mL/min): N/A
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 0 ppm H_2S: 0
LEL: LEL: 0 %; Oxygen: 20.8%; Carbon: 5 ppm

Purging

Purging/sampling crew: E. Weaver / M. Yantin
Purge date/beginning time: 5/10/09 1010
Initial (pre-purging) DTW (ft. BTOC): 10.02

Purge date/completion time: 5/10/09 1148
Final (post-purging) DTW (ft. BTOC): DRY

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 22 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 22 ft) + 0.3 L = .52 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .52 L x 3 = 1.56 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 11.85 ft x .164 Gal/ft = 1.94 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10 ft + 2 ft) x 2.46 gal/ft) x 0.3 = 8.86 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 1.94 gal + 8.86 gal = 10.79 gal X 3.785 L/gal = 40.86

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
40.86	81.72	122.59	163.45	204.31

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.070	.020	.60	—	—	—	—	—	.60

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/10/09	1020	10.87	.070	1.0	11.63	0.954	343.8	6.67	7.27	0.0
"	1025	11.25	.020	1.1	12.11	0.941	-253.9	6.85	6.06	0.0
"	1030	11.42	.020	1.2	12.84	0.944	-276.0	6.87	5.96	0.0
"	1035	11.51	.020	1.3	13.43	0.945	-302.1	6.87	5.81	0.0
"	1038	12.61	.6	1.36	11.70	0.943	-311.8	6.87	6.76	0.0
"	1048	13.94	.6	7.36	9.85	1.048	-536.0	6.80	5.77	0.0
"	1058	15.20	.6	13.36	9.79	1.078	-538.7	6.78	5.77	0.0
"	1108	16.78	.6	19.36	9.82	1.077	-536.8	6.79	5.74	0.0
"	1118	18.59	.6	25.36	9.84	1.077	-539.5	6.79	5.72	0.0

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/10/09	1128	19.50	.6	31.36	—	—	NO READING		—	—
"	1138	21.51	.6	37.36	—	—	NO READING		—	—
"	1148	DRY	.6	43.36	—	—	NO READING		—	—
5/11/09	0755	21.43	NA	43.36	8.72	0.982	-261.8	6.68	9.81	0.0

MRY 5/11/09

Sampling

Sampling beginning time: 0755 Sampling completion time: 0835

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/11/09	0755	21.43	NA	43.36	8.72	0.982	-261.8	6.68	9.81	0.0

Sample Information

Sample ID: AP3052 Sample collection date/time: 5/11/09 0755

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
			MRY 5/10/09		

Comments: Low-flow not possible. Water level dropping @ 20mL/min Sample collected by BAILER.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 050909-ACCT

Location Code: **AP1-BEDGW-001**
Sample Number: **AP3053**
Sample Name: **PBOW-09-GW-AP1-BEDGW-001-AP3053-R1**
Sampling Method: ~~GRAB~~ BAILER
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: BAILER YSI 6820

Task: **TPAPLBRC**
Collection Date: 5/9/09
Collection Time: 0815
Start Depth: 78.4' btoc
End Depth: 82.0' btoc
Sample Matrix: **WATER**
Sample Team: E.W Lauer / M. Yantin

QC Partners:
(TB) 051109-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

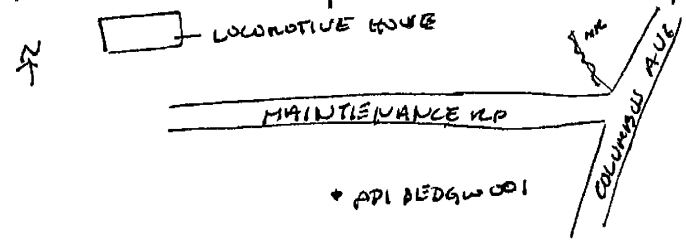
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	~~1~~ 1L	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 82.05' btoc **Depth To Water:** 78.4' btoc

Comments: Sample collected by bailer.
Hach Iron Test: 0.0 mg/L.
Limited Sampling Suite (Only 1 L Amber for Explosives)

Sketch Location:



Equipment used	SN
YSI 6820	28821
water level ind	LUE 00247
Bailer	NA
LEL meter	56928

Logged BY / Date: M. Yantin / 5/9/09 *Reviewed BY / Date:* Edward W Lauer 11-11-0

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP3053
Weather: Cloudy 70°

Sampling location ID: API-BEDGW-001
Collection Time/Date: 5/9/09 0815

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other Bailer (circle or add one)

Pump installation crew: E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 82.05
Bladder pump settings: CPM NA
Refill (seconds): NA
Discharge (seconds): NA
Throttle (psi): NA
Discharge tube length (ft.): NA

Screen Interval (ft. BTOC): 66.7 to 81.7
Pump intake depth (ft BTOC): NA
Max. sustainable pump rate (mL/min): NA
Appearance of product: Oil
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 6.8 ppm H_2S: 6
LEL: LEL: 0 %; Oxygen: 20.8%; Carbon: 0 ppm

Purging

Purging/sampling crew: E. Weaver
Purge date/beginning time: 5/8/09 1520
Initial (pre-purging) DTW (ft. BTOC): 59.55

Purge date/completion time: 5/8/09 1900
Final (post-purging) DTW (ft. BTOC):

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. MRY 5/8/09 — 0.02 L for a 3/8" I.D. tube
Tubing length = _____ ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = _____ L
No. of tubing volumes purged: _____
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 22.5 ft x .164 Gal/ft = 3.69 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 15 ft + 5.0 ft) x 1.31 gal/ft) x 0.3 = 7.86 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 3.69 gal + 7.86 gal = 11.55 gal X 3.785 L/gal = 43.7 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
43.7	87.4	131.1	174.8	218.5

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	NA								

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L) Gal	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/8/09	1610	NA	NA	7 Gal	12.58	13.23	-475.8	6.56	8.05	269.8
"	1620	NA	NA	10 Gal	12.76	13.20	-705.8	6.55	3.29	56.3
"	1625	NA	NA	10.5 Gal	13.01	13.20	-667.3	6.55	1.98	60.4
"	1645	DRY	NA	DRY	—	—	NO	READING	—	—
5/9/09	0815	78.4	NA	12.5	11.03	13.78	-513.8	6.52	9.03	218.9
					MRY					
					5/8/09					

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

MPJ 5/8/09

Sampling

Sampling beginning time: 0815

Sampling completion time:

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/9/09	0815	78.4	NA	12.5	11.03	13.78	-513.8	6.52	9.03	218.9

Sample Information

Sample ID: AP 3053

Sample collection date/time: 5/9/09 0815

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
VOCs		40A vials	Cyanide		500 mL HDPE
Explosives / SVOCs		1L Amber			
Metals (Hardness		500 mL HDPE			
Filtered Metals		"			
Alkalinity		1L HDPE			

Comments:
well has crude oil. Bailer was used to purge one well volume and remove product. 12.5 Gal total purged.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-051009-ACCT

Location Code: **AP1-BEDGW-002**
Sample Number: **AP3054**
Sample Name: **PBOW-09-GW-AP1-BEDGW-002-AP3054-R1**
Sampling Method: ~~GRAB~~ BA
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bailer / YSI 6820

Task: **TPAPLBRC**
Collection Date: 5/10/09
Collection Time: 0900
Start Depth: 56.34' btoc
End Depth: 62.17' btoc
Sample Matrix: **WATER**

QC Partners:
(TB) 051109-TB (ER) —— (FB) ——

Sample Team: E. Weaver / M. Yentin

ERPIMS Values:
Sacode:
Lot Control#:

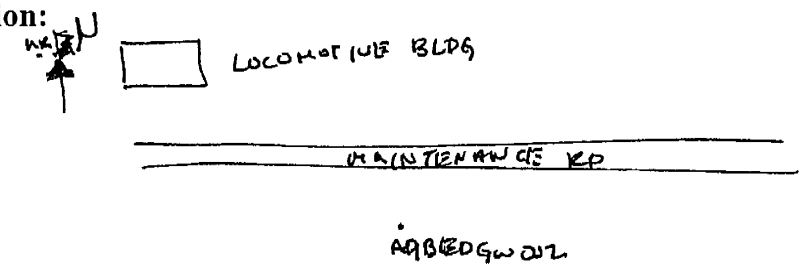
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 62.17' btoc **Depth To Water:** 56.34' btoc

Comments: Sample collected by bailer. Not enough water is available for FD and FS.
Iron Hach Test: 0.0 mg/L

Sketch Location:



Logged BY / Date: M. Yentin 5/10/09 *Reviewed BY / Date:* Edward G. Weaver 11/11/09

Shaw Shaw Environmental, Inc.

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: AP 3054
Weather: Windy / Cloudy 58°

Sampling location ID: API-BEDGW-002
Collection Time/Date: 5/10/09 0900

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: E. Weaver / M. Yantin
Casing diameter (inches): 2
Total well depth (ft. BTOC): 62.17
Bladder pump settings: CPM 2-2-2-6
Refill (seconds): 25-27-29-28-5
Discharge (seconds): 5-3-1-2-5
Throttle (psi): 35-35-30-35-40
Discharge tube length (ft.): 59

Screen Interval (ft. BTOC): 48.82 to 61.82
Pump intake depth (ft BTOC): 54.1
Max. sustainable pump rate (mL/min): NA
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 118.6 ppm
H_2S: 200
LEL: LEL: 100 %; Oxygen: 19.3 %; Carbon: 0 ppm

Purging

Purging/sampling crew: E. Weaver / M. Yantin
Purge date/beginning time: 5/9/09 1500
Initial (pre-purging) DTW (ft. BTOC): 37.33'

Purge date/completion time: 5/9/09 1655
Final (post-purging) DTW (ft. BTOC): DRY

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. — 0.02 L for a 3/8" I.D. tube
Tubing length = 59 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 59 ft) + 0.3 L = .89 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .89 L x 3 = 2.67 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 24.84 ft x .164 Gal/ft = 4.07 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 15 ft + 3 ft) x 1.31 gal/ft) x 0.3 = 7.07 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 4.07 gal + 7.07 gal = 11.14 gal X 3.785 L/gal = 42.18L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
42.18	84.36	126.54	168.72	210.9

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.204	.034	.66	—	—	—	—	—	0.66

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/9/09	1525	38.20	.204	.5	13.72	6.378	-371.9	6.48	0.41	0.0
"	1530	39.60	.034	0.67, ~~.84~~ NR	13.07	6.378	-492.8	6.45	0.28	1.5
"	1535	40.69	.034	.84, ~~1.18~~ NR	12.71	6.313	-510.6	6.44	"	0.6
"	1545	NA	.034	1.18	12.62	6.280	-525.6	6.43	"	"
"	1555	NA	.66	7.78	12.51	6.270	-527.8	6.43	0.27	0.0
"	1605	43.92	.66	14.38	12.56	6.269	-530.1	"	"	0.0
"	1615	NA	.66	20.98	12.60	6.268	-528.2	"	"	0.0
"	1625	NA	.66	27.58	—	— NO READING			—	—
"	1635	50.0	.66	34.18	—	— NO READING			—	—

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/9/09	1645	NA	0.66	40.78	—	NO	READING		—	—
"	1655	DRY	0.66	47.38	—	NO	READING		—	—
5/10/09	0900	56.34	NA	47.38	9.81	6.421	-418.9	6.43	8.71	0.0

MRY 5/10/09

Sampling

Sampling beginning time: 0900 Sampling completion time: 0930

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/10/09	900	56.34	NA	47.38	9.81	6.421	-418.9	6.43	8.71	0.0

Sample Information

Sample ID: AP 3054 Sample collection date/time: 5/10/09 0900

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

MRY 5/10/09

Comments:

Several settings were attempted. Lowest rate was 0.034 L/min, but water level dropped. Low flow is not possible.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WK

Manager: Steve Downey

RFA / COC Number: DW 051909-ACCT

Location Code: ~~LBA-MW01~~ MRY MNTA - BEDGW001

Sample Number: ~~LB3067~~ MRY LB3074

Sample Name: ~~PBOW-09-GW-LBA-MW01-LB3067-REG~~ MRY PBOW 09 GW MNTA BEDGW001 - LB3074 - REG

Sampling Method: GRAB

Sample Type: GW *Sample Purpose:* REG

Sampling Equip: Bladder pump / YSI 6920 / Bailer

QC Partners:

(TB) 051909 -TB (ER) — (FB) —

Task: TPAPLBRC

Collection Date: 5/19/09

Collection Time: 0920

Start Depth: 40.41' btoc

End Depth: 43.41' btoc

Sample Matrix: WATER

Sample Team: M. Yantin / E. Weaver

ERPIMS Values:

Sacode:

Lot Control#:

Containers

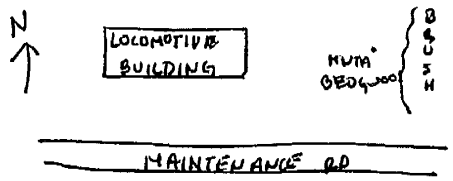
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE
HARDNESS	N	I	1	500	mL	HDPE

Groundwater Information:

Measured Well Depth: 66.35' btoc Depth To Water: 40.41' btoc

Comments: Sample collected by bailer
Iron Hach Test: 0.0 mg/L

Sketch Location:



EQUIPMENT USED	SN
YSI 6920	~~LUE~~ 28821
water meter	LUE 002476
well wizard	LUE 002731
MP10	002723
LEL	56928

Logged BY / Date: M. Yantin 5/19/09

Reviewed BY / Date: Edward Weaver 11-11-0

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Area or Site ID: PBOW
Sample ID: LB3074
Weather: Sunny 60°

Sampling location ID: MNTN-B5DGW001
Collection Time/Date: 5/19/09 0920

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: M. Yantin / E. Weaver
Casing diameter (inches): 2
Total well depth (ft. BTOC): 64.00 bgs / 68.35' BTOC
Bladder pump settings: CPM 2-2-2.6
Refill (seconds): 28-25-28.5
Discharge (seconds): 2-5-2-5
Throttle (psi): 30-40-40-50
Discharge tube length (ft.): 65

Screen Interval (ft. BTOC): 48.75 to 63.75
Pump intake depth (ft BTOC): 56.25
Max. sustainable pump rate (mL/min): NA
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): N
PID: 65.8 ppm H2S: 200
LEL: LEL: 33 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: M. Yantin / E. Weaver
Purge date/beginning time: 5/18/09 1400
Initial (pre-purging) DTW (ft. BTOC): 36.81

Purge date/completion time: 5/18/09 1610
Final (post-purging) DTW (ft. BTOC): DRY

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = ~~63~~ 67 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 67 ft) + 0.3 L = .97 L
No. of tubing volumes purged: 3
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = .97 L x 3 = 2.91 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = .164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 29.54 ft x .164 Gal/ft = 4.84 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 15 ft + 2 ft) x 2.46 gal/ft) x 0.3 = 12.54 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 4.84 gal + 12.54 gal = 17.38 gal X 3.785 L/gal = 65.8 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
65.8	131.6	197.4	263.2	328.5

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.032	.54	.60	—	—	MYY	5/18/09	—	—

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
5/18/09	1420	37.51	.032	1L	15.53	9201	-793.3	6.34	0.78	0.7
"	1430	37.49	.032	1.32	16.49	9.083	-781.9	6.34	0.60	0.4
"	1440	37.65	.032	1.64	16.90	9.086	-774.6	6.34	0.59	0.3
"	1445	NA	.54	4.34	12.55	9.295	-733.8	6.35	2.62	13.0
"	1450	NA	.60	7.34	12.48	9.234	-731.9	6.35	1.78	12.5
"	1455	NA	.60	10.34	12.45	9.218	-740.8	6.35	1.62	7.4
"	1500	NA	.60	13.34	12.45	9.215	-736.9	6.35	1.60	7.0
"	1610	DRY	.60	55.34	—	NO READING		—	—	—
"	0920	40.41	NA	55.34	15.17	10.53	-200.8	6.44	0.28	21.9

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

MRG 5/18/09

Sampling

Sampling beginning time: 0920 Sampling completion time: 0928

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
5/19/09	0920	40.41	NA	55.34	15.17	10.53	-200.8	6.44	0.28	21.5

Sample Information

Sample ID: LB 3074 Sample collection date/time: 5/ /09

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

MRG 5/18/09

Comments: Low flow is not possible. Lowest purge rate was 32 mL/min and water level was dropping. Well is gassing and it is difficult to determine water level.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

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Sample Collection Log

133422 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW-051009-ACCT

Location Code: **FIELDQC-AP1**
Sample Number: **ER1**
Sample Name: **FIELDQC-AP1-ER1**
Sampling Method: **QC**
Sample Type: **BW** *Sample Purpose:* **ER**
Sampling Equip: Bladder pump

Task: **MW-RINSATES**
Collection Date: 5/10/09
Collection Time: 1200
Start Depth: NA
End Depth: NA
Sample Matrix: **WATER**
Sample Team: E. Weaver / M. Yantin

QC Partners:
(TB) 051009-TB (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Comments: Sample collected after decontamination of bladder pump from AP1-MW03. DI water used was from Lot # 38786.

Sketch Location:

No sketch

Logged BY / Date: M. Yantin 5/10/09 *Reviewed BY / Date:* Edward G. Weaver 11-11-09

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Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW110609ACCT

Location Code: AP1-MW01
Sample Number: AP3070
Sample Name: PBOW-09-GW-AP1-MW01-AP3070-REG
Sampling Method: BP
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: bladder pump

Task: OCT09-GW
Collection Date: 11/4/09
Collection Time: 1700
Start Depth: –
End Depth: –
Sample Matrix: WATER
Sample Team: JAB, CPS

QC Partners: (TB) No (ER) No (FB) No

Containers

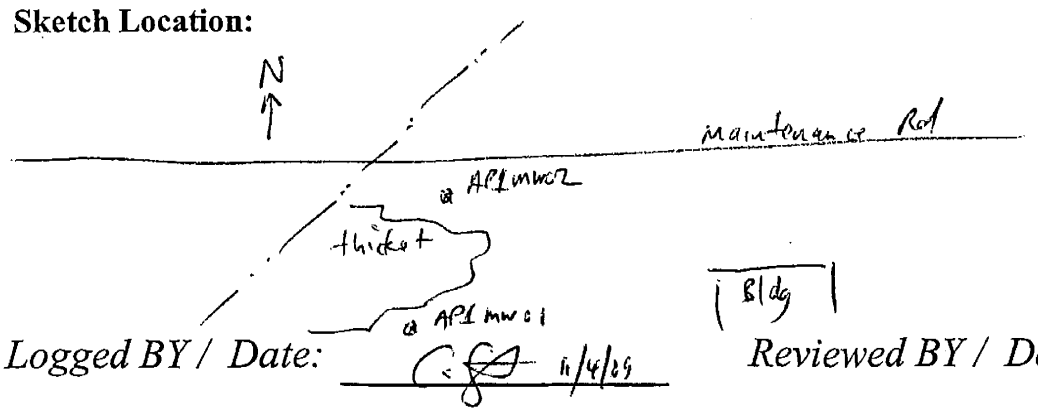
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

ERPIMS Values:
Sacode:
Lot Control#:

Groundwater Information:
Measured Well Depth: 18.76 **Depth To Water:** 8.12

Comments: Ferrous Iron 2.0 mg/L

Sketch Location:



Logged BY / Date: CPS 11/4/09 *Reviewed BY / Date:* Edward H Kaan 5/11/

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Shaw Environmental, Inc.

Area or Site ID: APA

Sample ID: AP3070

Weather: 45° Clear SW

Sampling location ID: APA - MW01

Collection Time/Date: 11/4/09 1645

Pump Installation Bladder/Fultz/Peristaltic/Grundfos/Other _____ (circle or add one)

Pump installation crew: JAB, CPS

Casing diameter (inches): 2

Total well depth (ft. BTOC): ~~14.35~~ CPS 18.76

Bladder pump settings: CPM —

Refill (seconds): —

Discharge (seconds): —

Throttle (psi): —

Discharge tube length (ft.): ~~18.25~~ 20

Screen Interval (ft. BTOC): 12.4 to 22.4

Pump intake depth (ft BTOC): 1

Max. sustainable pump rate (mL/min): 90

Appearance of product: none

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID: — ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.4 %; Carbon: 0 ppm

Purging

Purging/sampling crew: JAB

Purge date/beginning time: 11/4/09 1606

Initial (pre-purging) DTW (ft. BTOC): 8.12

Purge date/completion time: 11/4/09 1645

Final (post-purging) DTW (ft. BTOC): 8.75

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 20 ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 20 ft) + 0.3 L = 0.5 L

No. of tubing volumes purged: 3

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.50 L x 3 = 1.50 L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 10.64 ft x 0.164 Gal/ft = 1.74 gallons

18.76
9.12
10.64

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= 0.041 x ((9)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 10 ft + 4.28 ft) x 2.46 gal/ft) x 0.3 = 10.5 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 10.53 gal + 1.74 gal = 12.3 gal X 3.785 L/gal = 46 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
46	92	138	184	230

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	4	—	—	—	—	—	—	—	—
				± 1	± 3%	± 10	± 0.1	± 10%	3 < 100

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11/4/09	1613	9.36	62 mL	1000 mL	12.18	1.57	2.6	6.80	5.86	26.00
11/4/09	1619	9.09	60	1460 mL	12.00	1.58	3.0	6.80	4.21	18.7
11/4/09	1626	8.91	40	1740 mL	11.64	1.59	2.7	6.80	3.26	17.6
11/4/09	1633	9.00	90	2.37 L	11.03	1.59	4.2	6.77	2.45	18.1
11/4/09	1640	8.85	52	2.73 L	10.89	1.59	4.1	6.76	1.75	11.4
11/4/09	1645	8.75	42	2.94 L	10.86	1.64	4.6	6.76	1.65	1.63
		Low Flow achieved								

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

CFS

API MW01

Sampling

Shaw™ Shaw Environmental, Inc.

Sampling completion time: 1700

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11/4/09	1645	8.75	42	2.94 L	10.76	1.64	4.6	6.76	1.65	11.3

Sample Information

Sample ID: AP3070

Sample collection date/time: 11/4/09 1700

Duplicate sample collected (Y/N): N

Duplicate sample ID: N

Split sample collected (Y/N):

Split sample ID:

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3x40 ml VOA's	Alk, Sl, Cl TDS TSS		1x1L HDPE
TCL SVOC	8270	2x1L Amber	Cyanide	9010/9012	1x500 ml HDPE
Explosives	8330	2x1L Amber	Nitrate	—	1x500 ml HDPE
Metals Dissolved	6010/7470	1x500 ml HDPE			
Metals Total	6010/7470	1x500 ml HDPE			

Comments:

Ferrous Iron 2.0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 110609ACCT

Location Code: AP1-MW02
Sample Number: AP3071
Sample Name: PBOW-09-GW-AP1-MW02-AP3071-REG
Sampling Method: BP
Sample Type: GW *Sample Purpose:* REG
Sampling Equip: bailer

Task: OCT09-GW
Collection Date: 11/6/09
Collection Time: 0920
Start Depth: —
End Depth: —
Sample Matrix: WATER
Sample Team: JAB, CFS

QC Partners:
(TB) No (ER) No (FB) No

ERPIMS Values:
Sacode:
Lot Control#:

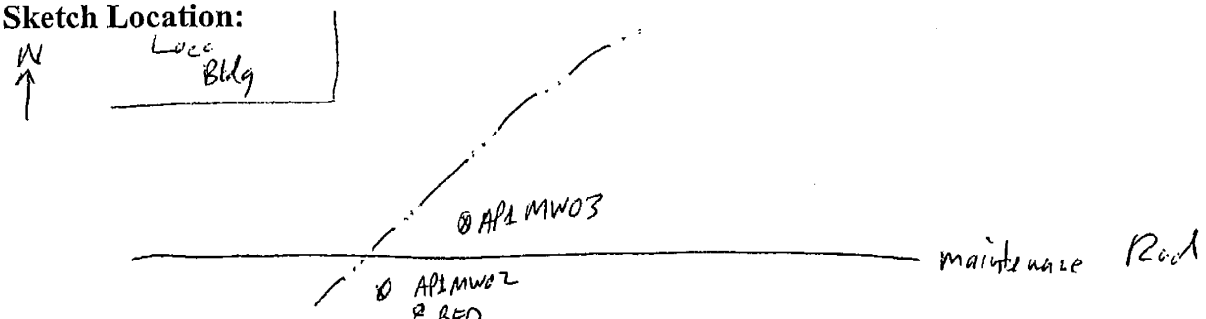
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 22.10 **Depth To Water:** 6.9

Comments: Ferrous Iron = 0 mg/L

Sketch Location:



Logged BY / Date: [signature] 11/6/09

Reviewed BY / Date: [signature] 5/11/20

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw™ Shaw Environmental, Inc.

Area or Site ID: AP 1

Sample ID: AP 3071

Weather: overcast 45° west wind light Rain

Sampling location ID: AP1-MW02

Collection Time/Date: 11/6/09 0920 ~~1505~~

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: JAB, CPS

Casing diameter (inches): 2

Total well depth (ft. BTOC): 22.10

Bladder pump settings: CPM —

Refill (seconds): —

Discharge (seconds): —

Throttle (psi): —

Discharge tube length (ft.): 25

Screen Interval (ft. BTOC): 12.4 to 22.4

Pump intake depth (ft BTOC): 17.4

Max. sustainable pump rate (mL/min): —

Appearance of product: None

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID : — ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: JAB, CPS

Purge date/beginning time: 11/5/09 1525

Initial (pre-purging) DTW (ft. BTOC): 6.9

Purge date/completion time: 11/5/09 1455

Final (post-purging) DTW (ft. BTOC): Dry

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 3 ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 25 ft) + 0.3 L = 0.55 L

No. of tubing volumes purged: 3

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.55 L x 3 = 1.65 L

Monitoring well purge volume calculations WC

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 15.2 ft x 0.164 Gal/ft = 2.49 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 10 ft + 5.5 ft) x 2.46 gal/ft) x 0.3 = 11.4 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 11.4 gal + 2.49 gal = 13.9 gal X 3.785 L/gal = 52.7 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
53	106	159	212	265

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.044	.048	.054	.050	—	—	—	—	.050

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11/5/09	1530	7.75	44	1L	12.08	1.73	-13.8	7.13	3.90	-2.4
11/5/09	1542	8.15	48	—	11.61	1.76	-14.6	7.14	2.68	-4.4
11/5/09	1552	8.65	54	—	10.89	1.76	-13.7	7.13	2.21	-4.2
11/5/09	1557	8.80	50	2.5L	—	—	—	—	—	—

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

AP2 MW02

Sampling

Shaw Environmental, Inc.

Sampling completion time: —

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11/6/09	0920	19.06	—		10.29	1.82	-24.9	7.28	6.98	-2.3

Sample Information

Sample ID: AP3071

Sample collection date/time: 11/6/09 0920

Duplicate sample collected (Y/N): N

Duplicate sample ID: N

Split sample collected (Y/N): N

Split sample ID: N

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3x40 ml vials	Alk, Cl, S, TDS	TSS	1x1L HDPE
TCL SVOC	8270	2x1L Amber	Cyanide	9010/9012	1x500 ml HDPE
explosives	8330	2x1L Amber	Nitrate	—	1x500 ml HDPE
Metals Dis.	6010/7470	1x500 ml Amber	Hardness	—	—
Metals Tot	6010/7470	1x500 ml Amber			

Comments:

Ferrous Iron = 0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW110609ACCT

Location Code: **AP1-MW03**
Sample Number: **AP3072**
Sample Name: **PBOW-09-GW-AP1-MW03-AP3072-REG**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: bailer

Task: **OCT09-GW**
Collection Date: 11/6/09
Collection Time: 0830
Start Depth: —
End Depth: —
Sample Matrix: **WATER**
Sample Team: JAB, CBS

QC Partners:
(TB) No (ER) No (FB) No

ERPIMS Values:
Sacode:
Lot Control#:

Containers

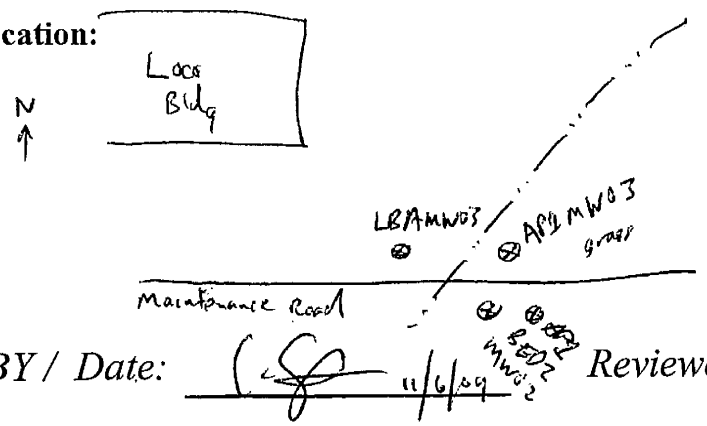
Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

NOT collected due to well sampled dry

Groundwater Information:
Measured Well Depth: 21.6 **Depth To Water:** 13.60

Comments: Ferrous Iron = 0 mg/L

Sketch Location:



Logged BY / Date: 11/6/09 *Reviewed BY / Date:* 5-11-2010

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw® Shaw Environmental, Inc.

Area or Site ID: AP1
Sample ID: AP3072
Weather: overcast, 45° west wind

Sampling location ID: AP1-MW03
Collection Time/Date: 11/5/09, 1250

Pump Installation: Bladder/Fultz/Peristaltic/Grundfos/Other _____ (circle or add one)

Pump installation crew: JAB, CPS
Casing diameter (inches): 2
Total well depth (ft. BTOC): 21.6
Bladder pump settings: CPM —
Refill (seconds): —
Discharge (seconds): —
Throttle (psi): —
Discharge tube length (ft.): 25

Screen Interval (ft. BTOC): 11.87 to 21.87
Pump intake depth (ft BTOC): 16.87
Max. sustainable pump rate (mL/min): —
Appearance of product: clear
Discharge tube diameter: 1/4" ID
Inlet reducer used (Y/N): —
PID: — ppm H_2S: 0 ppm
LEL: LEL: 0 %; Oxygen: 21.0 %; Carbon: 0 ppm

Purging

Purging/sampling crew: JAB, CPS
Purge date/beginning time: 11/5/09 1327
Initial (pre-purging) DTW (ft. BTOC): 13.60

Purge date/completion time: 11/5/09 1449
Final (post-purging) DTW (ft. BTOC): _____

Low Flow purge tubing volume calculations

No Low flow

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters
Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube
Tubing length = 25 ft.
Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 25 ft) + 0.3 L 0.55 L
No. of tubing volumes purged: _____
Total purge volume: Tubing volume (L) x No. of tubing volumes purged = 0.55 L x 3 = 1.65 L

Monitoring well purge volume calculations WC = 8.27

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft
Well volume (gallons) = Water Column (ft) x Gal/ft = 8.27 ft x 0.164 Gal/ft = 1.36 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches
= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft
Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)
= ((Screen Height 10 ft + 0 ft) x 2.46 gal/ft) x 0.3 = 7.38 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 1.36 gal + 7.38 gal = 8.73 gal X 3.785 L/gal = 33 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
33 L	66 L	99 L		

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	58	24	40	52	50	—	—	—	.050

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11/5/09	1331	13.95	58	1 L	12.16	1.18	-8.9	7.05	6.23	-1.9
11/5/09	1342	14.02	24	1.2 L	12.12	1.22	-4.2	7.03	3.87	-3.8
11/5/09	1352	14.18	40	1.6 L	11.80	1.22	-9.7	7.06	2.53	5.9
11/5/09	1405	14.38	52	2.3 L	11.97	1.21	-12.2	7.10	1.61	16.8
11/5/09	1415	14.52	50	2.8 L	11.77	1.2	-12.4	7.13	1.24	16.6
			No	Low Flow						
11/5/09	1449	20.12	dry							

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
				AP1-MW03						

Sampling

Shaw™ Shaw Environmental, Inc.

Sampling completion time: 0830

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11/6/09	0830	19.91	—	well	was	s	dry			

Sample Information

Sample ID: AP3072

Sample collection date/time: 11/6/09 0830

Duplicate sample collected (Y/N): N

Duplicate sample ID: NO

Split sample collected (Y/N): N

Split sample ID: NO

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3x40 ml vials	Alk, Cl, S, TDS, TSS	Various	1x1L HDPE
TCL SVOC	8270	2x1L Amber	Cyanide	NOT collected	
explosives	8330	2x1L Amber	Nitrates	–	1x500 ml HDPE
Metal Diss	6010/7470	1x500 ml HDPE	Hardness	–	
Metals Total	6010/7470	1x500 ml HDPE			

Comments:

Ferrous Iron = 0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW110609ACCT

Location Code: **AP1-BEDGW-001**
Sample Number: **AP3073**
Sample Name: **PBOW-09-GW-AP1-BEDGW-001-AP3073-R1**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bailer, string

Task: **OCT09-GW**
Collection Date: 11-6-09
Collection Time: 0945
Start Depth: 70.47
End Depth: 74.75
Sample Matrix: **WATER**
Sample Team: EW/BT

QC Partners:
(TB) — (ER) — (FB) —

ERPIMS Values:
Sacode:
Lot Control#:

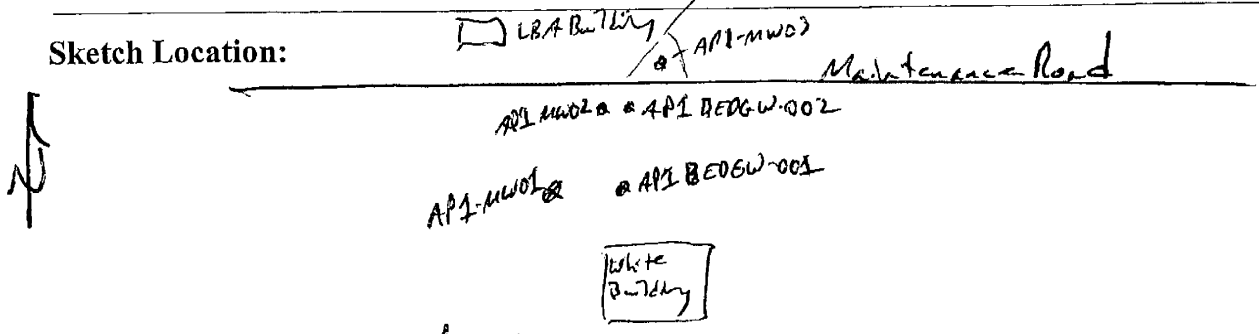
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 82.05 **Depth To Water:** 70.47'

Comments: Fe^{2+} 0.0 mg/L.

Sketch Location:



Logged BY / Date: E. Weaver 11-6-09 *Reviewed BY / Date:* Edward J. Weaver 5/11/2011

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw™ Shaw Environmental, Inc.

Area or Site ID: PBOW

Sample ID: AP3073

Weather: Clear, Sunny ≈ 55°F

Sampling location ID: AP1-BETGW-001

Collection Time/Date: 0945 / 11-6-09

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other Bailer (circle or add one)

Pump installation crew: EW/BT

Casing diameter (inches): 2"

Total well depth (ft. BTOC): 82.05

Bladder pump settings: CPM —

Refill (seconds): —

Discharge (seconds): —

Throttle (psi): —

Discharge tube length (ft.): —

Screen Interval (ft. BTOC): 66.70 to 81.7

Pump intake depth (ft BTOC): —

Max. sustainable pump rate (mL/min): —

Appearance of product: DTP-44.90' (0.9' H.C.)

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID: 0 ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 20.8 %; Carbon: 0 ppm

Purging

Purging/sampling crew: EW/BT

Purge date/beginning time: 11-5-09

Initial (pre-purging) DTW (ft. BTOC): 45.80

Purge date/completion time: 11-5-09 / 1743

Final (post-purging) DTW (ft. BTOC): Dry

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = _____ ft.

Tubing volume (Liters)= (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x ____ ft) + 0.3 L = _____ L

No. of tubing volumes purged: _____

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 36.25 ft x 0.164 Gal/ft = 5.95 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 15 ft + 2 ft) x 1.31 gal/ft) x 0.3 = 6.68 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 6.68 gal + 5.95 gal = 12.63 gal X 3.785 L/gal = 47.80 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
47.8	95.60	143.4	191.2	239.0

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	—	—	—	—	—	—	—	—	—

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume Gal/L	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11-5-09	1725	NA	—	5	9.95	13.44	-3.7	6.68	-5.48	24.6
11-5-09	1730	NA	—	7.5	9.93	12.68	-2.2	6.65	-6.01	26.2
11-5-09	1735	NA	—	10.0	9.91	12.57	-2.8	6.62	-6.03	23.8
11-5-09	1740	NA	—	12.5	9.92	12.59	-2.9	6.65	-5.99	24.5
11-5-09	1743	Dry	—	—	—	—	—	—	—	—

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
				EW						

Sampling

Shaw™ Shaw Environmental, Inc. _____

Sampling completion time: 1030 / DTW 74.75

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11-6-09	0945	70.47	—	—	10.98	14.24	-6.3	6.66	6.31	5.4

Sample Information

Sample ID: AP3073

Sample collection date/time: 11-6-09/0945

Duplicate sample collected (Y/N): —

Duplicate sample ID: —

Split sample collected (Y/N): —

Split sample ID: —

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOCs	8260	3x40 ml vials	Turb, Alk, TDS, TSS, Sulfate, chloride	Various	1x1L HDPE
TCL SVOCs	8270	2x1L Amber	Cyanide	9010/9012	1x500 ml HDPE
Explosives	8330	2x1L Amber	Nitrate	—	1x500 ml HDPE
Total TAL Metals Hardness	6010/7470	1x500ml HDPE			
Dissolved TAL Metals	6010/7470	1x500ml HDPE			

Comments: Fe^{2+} 0.0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW 11109 Acct

Location Code: **AP1-BEDGW-002**
Sample Number: **AP3074**
Sample Name: **PBOW-09-GW-AP1-BEDGW-002-AP3074-RI**
Sampling Method: **BP**
Sample Type: **GW** *Sample Purpose:* **REG**
Sampling Equip: Bailer, string.

Task: **OCT09-GW**
Collection Date: 11-10-09
Collection Time: 0855
Start Depth: 58.73
End Depth: Dry
Sample Matrix: **WATER**

QC Partners:
(TB) — (ER) AP1-ER1109 (FB) —

Sample Team: EW / BT

ERPIMS Values:
Sacode:
Lot Control#:

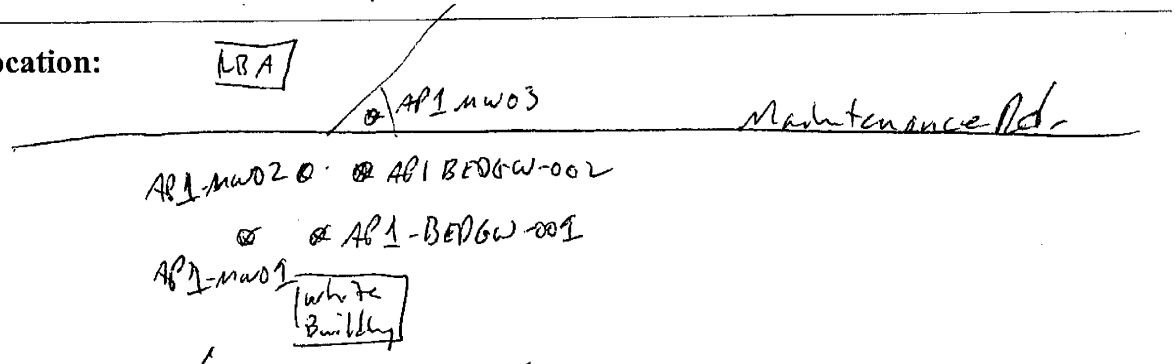
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Groundwater Information:
Measured Well Depth: 62.17 **Depth To Water:** 58.73

Comments: Fe^{2+} - 0.0 mg/L. Collected equipment rinsate AP1-ER1109 at after decontamination of pump used at this location

Sketch Location:



Logged BY / Date: 11-10-09 *Reviewed BY / Date:* 5-11-2

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Shaw Environmental, Inc.

Area or Site ID: PBOW

Sample ID: AP3074

Weather: Over-cast ≈ 50°F

Sampling location ID: AP-BED6W-002

Collection Time/Date: 0855 / 11-10-09

Pump Installation (Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: EW/BT

Casing diameter (inches): 2"

Total well depth (ft. BTOC): 62.17

Bladder pump settings: CPM 2

Refill (seconds): 28 / 10

Discharge (seconds): 2 / 5

Throttle (psi): 38

Discharge tube length (ft.): 65

Screen Interval (ft. BTOC): 46.82' to 61.82'

Pump intake depth (ft BTOC): 54.1'

Max. sustainable pump rate (mL/min):

Appearance of product: None

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID: 1.7 ppm H_2S: 0 ppm

LEL: LEL: 0 %; Oxygen: 21.4 %; Carbon: 0 ppm

Purging

Purging/sampling crew: EW/BT

Purge date/beginning time: 11-9-09 / 1240

Initial (pre-purging) DTW (ft. BTOC): 40.66

Purge date/completion time: 11-9-09 / 1451

Final (post-purging) DTW (ft. BTOC): Dry

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 65 ft.

Tubing volume (Liters) = (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 65 ft) + 0.3 L = 0.95 L

No. of tubing volumes purged: 2

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

Could not low flow. Purged at 50 ml/min and the level kept dropping. Purged at 30 ml/min, water level kept dropping.

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 21.51 ft x 0.164 Gal/ft = 3.53 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. in inches & d is casing dia. in inches

= 0.041 x ((6)^2 - (2)^2) = 1.31 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 15 ft + 3 ft) x 1.31 gal/ft) x 0.3 = 7.07 EW gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 7.07 gal + 3.53 gal = 10.6 gal X 3.785 L/gal = 40.12 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
40.12	80.24	120.36	160.48	200.60

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.050	.030	.430	.400	.340	—	—	—	~~.340~~

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11-9-09	1246	40.66	.050	0.0	—	—	—	—	—	—
11-9-09	1310	42.13	.030	1.5	16.32	6.998	-13.3	6.79	0.91	4.0
11-9-09	1325	42.70	.430	1.95	16.80	6.896	-11.9	6.76	4.39	1.7
11-9-09	1340	48.61	.420	8.40	11.46	6.471	-10.1	6.73	3.93	11.6
11-9-09	1355	50.55	.430	14.70	11.31	6.158	-10.7	6.74	3.62	16.7
11-9-09	1410	53.80	.430	21.15	11.29	6.178	-10.1	6.73	3.55	10.2
11-9-09	1425	57.70	.400	27.60	11.21	6.034	-9.5	6.72	3.73	11.3
11-9-09	1440	59.60	.340	32.70	11.23	6.125	9.0	6.71	4.13	44.1
11-9-09	1451	Dry	—	—	—	—	—	—	—	—

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

EW

Sampling

Sampling completion time: ~~[illegible]~~ 1730

Shaw™ Shaw Environmental, Inc.

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11-10-09	0855	58.73	—	—	10.54	6.467	-25.3	7.08	8.82	33.2

Sample Information

Sample ID: AP3074

Sample collection date/time: 11-10-09/0855

Duplicate sample collected (Y/N): —

Duplicate sample ID: —

Split sample collected (Y/N): —

Split sample ID: —

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOC	8260	3x40 ml vials	Turb, Alk, TDS, TSS, Sulfate, Chl.	Various	1x1L ~~HDPE~~ HDPE
TCL SVOC	8270	2x1L Amber	Cyanide	9010/9012	1x500 ml HDPE
Explosives	8330	2x1L Amber	Nitrate	—	1x500 ml HDPE
Total TAL Metals (Hg)	6010/7470	1x500 ml HDPE			
Dissolved TAL Metals	6010/7470	1x500 ml HDPE			

Comments: Fe^{2+} - 0.0 mg/L

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PW110609ACT

Location Code: **IT-MNTA-BEDGW-001**
Sample Number: **BEDGW-001-~~ER~~1**
Sample Name: **PBOW-09-QC-MNTA-BEDGW-001-~~ER~~1109**
Sampling Method: **BP**
Sample Type: **QC** *Sample Purpose:* ~~ER~~ DUP REG
Sampling Equip: Bailer, string

Task: **OCT09-GW**
Collection Date: 11-6-09 ~~0830~~ EW
Collection Time: 0830
Start Depth: 41.75
End Depth:
Sample Matrix: **WATER**
Sample Team: EW/BT

QC Partners:
(TB) — (ER) — (FB) —

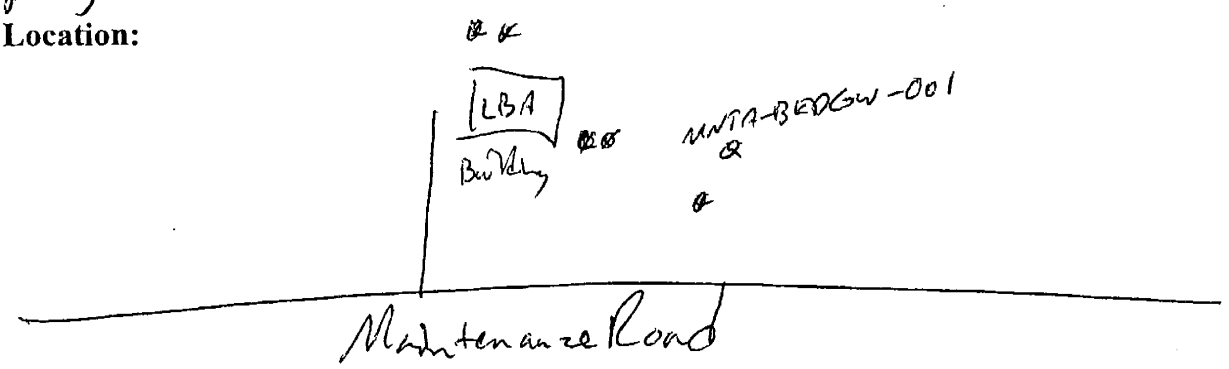
ERPIMS Values:
Sacode:
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
VOLATILES	N	A	3	40	mL	VOA VIAL
SEMIVOLATILES3	N	B	2	1	L	Amb. Glass
EXPLOSIVES	N	C	2	1	L	Amb. Glass
HARDNESS	N	D	1	500	mL	HDPE
METALS3-W	N	D	1	500	mL	HDPE
METALS3-W-F	Y	E	1	500	mL	HDPE
ALKALINITY	N	F	1	1	L	HDPE
CHLORIDE	N	F	1	1	L	HDPE
SULFATE	N	F	1	1	L	HDPE
TDS	N	F	1	1	L	HDPE
TSS	N	F	1	1	L	HDPE
TURB 180.1	N	F	1	1	L	HDPE
NO2/NO3	N	G	1	500	mL	HDPE
CYANIDE	N	H	1	500	mL	HDPE

Comments: Fe^{2+} 0.0 mg/L. Well had product in water during sampling, but was not detected with interface probe prior to or at completion of sampling

Sketch Location:



Logged BY / Date: E. Whitaker 11-6-09 *Reviewed BY / Date:* Edward Graham 2/18/10

ROUNDWATER SAMPLING FORM

Sheet 1 of 2

Shaw Shaw Environmental, Inc.

Area or Site ID: PBOW

Sample ID: MNTA-002

Weather: Clear 60's ~ 42°F, slight breeze

Sampling location ID: MNTA-BEDGW-002

Collection Time/Date: 11-6-09 / 0830

Pump Installation Bladder/Fultz/Peristaltic/Grundfos/Other_____ (circle or add one)

Pump installation crew: EW/BT

Casing diameter (inches): 2"

Total well depth (ft. BTOC): 66.19

Bladder pump settings: CPM 2

Refill (seconds): 27

Discharge (seconds): 3

Throttle (psi): 40

Discharge tube length (ft.): 71'

Screen Interval (ft. BTOC): 48.75' to 63.75'

Pump intake depth (ft BTOC): 56.25'

Max. sustainable pump rate (mL/min): —

Appearance of product: None

Discharge tube diameter: 1/4" ID

Inlet reducer used (Y/N): N

PID: 0.2 ppm H_2S: 10 ppm

LEL: LEL: 0 %; Oxygen 21.2 %; Carbon: 0 ppm

Purging

Purging/sampling crew: EW/BT

Purge date/beginning time: 11-5-09

Initial (pre-purging) DTW (ft. BTOC): 39.58

Purge date/completion time: 11-5-09/1610

Final (post-purging) DTW (ft. BTOC): 41.50'

Low Flow purge tubing volume calculations

Volume of Water in Tubing:

Bladder pump volume = 0.3 Liters

Tubing Liters/ft. (1/4" ID tubing) = 0.01 Liters/ft. 0.02 L for a 3/8" I.D. tube

Tubing length = 71 ft.

Tubing volume ~~(Liters)~~ = (Tubing Liters/ft. x Tubing length) + Pump volume = (0.01 L/ft x 71 ft) + 0.3 L = ~~0.01~~ 1.01 L

~~No. of tubing volumes purged:~~ _____

Total purge volume: Tubing volume (L) x No. of tubing volumes purged = _____ L x _____ = _____ L

Could not low flow. Pumped at 40-1 per min and water level continued to drop.

Monitoring well purge volume calculations

Volume of Water in Casing:

Gallons/foot = 0.041 x d^2, where d is casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft

Well volume (gallons) = Water Column (ft) x Gal/ft = 26.61 ft x 0.164 Gal/ft = 4.36 gallons

Volume of Water in Filter Pack:

Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole dia. In inches & d is casing dia. in inches

= 0.041 x ((8)^2 - (2)^2) = 2.46 gal/ft

Filter Pack Volume (gal) = ((Screen Height + water column above screen to below bent.) x gal/ft) x porosity (0.3)

= ((Screen Height 15 ft + 2 ft) x 2.46 gal/ft) x 0.3 = 12.55 gallons

Well Purge Volume:

Well Purge Volume = Filter Pack Volume + Well Volume = 12.55 gal + 4.36 gal = 16.91 gal X 3.785 L/gal = 64.0 L

1 x Well Purge Volume	2 x Well Purge Volume	3 x Well Purge Volume	4 x Well Purge Volume	5 x Well Purge Volume
64.0	128.0	192.0	256.0	320.0

Purge Rate

	Initial	2	3	4	5	6	7	8	Final
Flow rate (L/min)	.1	.04	.310	—	—	—	—	—	—

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidiy (NTU)
11-5-09	1505	39.58	.1	2.0	10.36	9.662	-10.2	6.81	1.27	10.8
11-5-09	1525	40.25	.04	2.6	—	—	—	—	—	—
11-5-09	1540	40.80	.04	3.2	10.18	9.576	-6.8	6.75	-0.24	10.8
11-5-09	1555	41.20	.310	7.85	9.58	9.456	-4.6	6.71	0.95	11.3
11-5-09	1610	41.50	.310	7.85	10.25	9.316	-0.3	6.63	2.60	25.0
11-5-09	1610	Well started gurgling, stopped pumping, will come back and sample tomorrow.								
11-6-09					9.53	9.365	-19.0	6.89	3.85	13.6

manual purge form

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

Water Quality Parameter Measurements (continued)

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)

EW

Sampling

Shaw™ Shaw Environmental, Inc.

Sampling completion time: 0915

Water Quality Parameter Measurements

Date	Time	DTW (ft. BTOC)	Purge Rate (L/min)	Purge Volume (L)	Temp. (C)	Electrical Conductivity (mS/cm)	ORP (mV)	pH (std units)	DO (mg/L)	Turbidity (NTU)
11-6-09	0830	41.75	—	—	9.53	9.365	-19.0	6.89	3.85	13.6

Sample Information

Sample ID: MNTA-001

Sample collection date/time: 11-6-09 / 0830

Duplicate sample collected (Y/N): —

Duplicate sample ID: —

Split sample collected (Y/N): —

Split sample ID: —

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TCL VOCs	8260	3 x 40 ml vials	Alk, Turb, TDS, TSS, Sulfate, Chloride	9010/9012	1 x 1L HDPE
Explosives	8330	2 x 1L Amber	Cyanide		1 x 500 ml HDPE
TCL SVOC	8270	2 x 1L Amber	Nitrate	—	1 x 500 ml HDPE
Total RAL Metals	6010/7470	1 x 500 ml HDPE			
Total Dissolved Metals	6010/7470	1 x 500 ml HDPE			

Comments: Fe^{2+} 0.0 mg/L - Well had product in water during sampling, but was not detected with interface probe prior to or at completion of sampling.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter;

APPENDIX C

ROCK CORE PHOTOGRAPHS

Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

1 of 4

Depth:

45.1' to 54.9'

Comments:

Photo 1: View of entire box.

Boring:

AP1-BEDGW-001

Box:

1 of 4

Depth:

45.1' to 54.9'

Comments:

Photo 2: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

1 of 4

Depth:

45.1' to 54.9'

Comments:

Photo 3: Close-up view of right portion of box.

Boring:

AP1-BEDGW-001

Box:

2 of 4

Depth:

54.9' to 64.6'

Comments:

Photo 4: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE | **Project Number: 132457**

Site Name: Former Plum Brook Works | **Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

2 of 4

Depth:

54.9’ to 64.6’

Comments:

Photo 5: Close-up view of left portion of box.

Boring:

AP1-BEDGW-001

Box:

2 of 4

Depth:

54.9’ to 64.6’

Comments:

Photo 6: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

3 of 4

Depth:

64.6' to 73.0'

Comments:

Photo 7: View of entire box.

Boring:

AP1-BEDGW-001

Box:

3 of 4

Depth:

64.6' to 73.0'

Comments:

Photo 8: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

3 of 4

Depth:

64.6’ to 73.0’

Comments:

Photo 9: Close-up view of right portion of box.

Boring:

AP1-BEDGW-001

Box:

4 of 4

Depth:

73.0’ to 81.3’

Comments:

Photo 10: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-001

Box:

4 of 4

Depth:

73.0' to 81.3'

Comments:

Photo 11: Close-up view of left portion of box.

Boring:

AP1-BEDGW-001

Box:

4 of 4

Depth:

73.0' to 81.3'

Comments:

Photo 12: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-002

Box:

1 of 3

Depth:

40.0’ to 49.0’

Comments:

Photo 1: View of entire box.

Boring:

AP1-BEDGW-002

Box:

1 of 3

Depth:
40.0’ to 49.0’

Comments:

Photo 2: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-002

Box:

1 of 3

Depth:

40.0' to 49.0'

Comments:

Photo 3: Close-up view of right portion of box.

Boring:

AP1-BEDGW-001

Box:

2 of 3

Depth:

49.0' to 57.5'

Comments:

Photo 4: View of entire box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-002

Box:

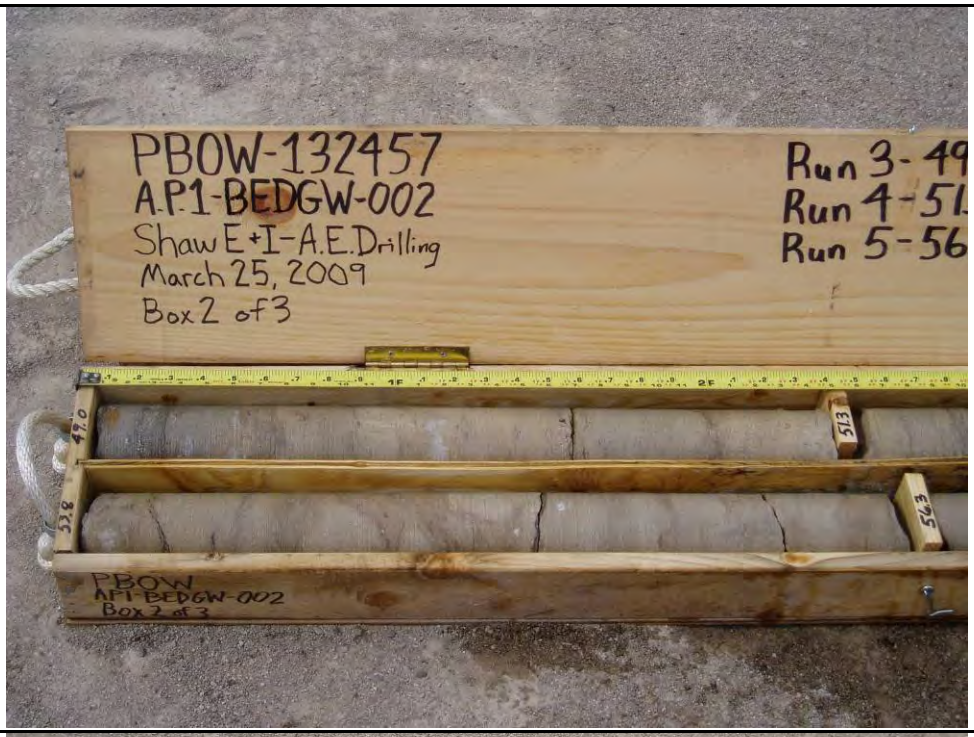
2 of 3

Depth:

49.0' to 57.5'

Comments:

Photo 5: Close-up view of left portion of box.



Boring:

AP1-BEDGW-002

Box:

2 of 3

Depth:

49.0' to 57.5'

Comments:

Photo 6: Close-up view of right portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-002

Box:

3 of 3

Depth:

57.5' to 61.3'

Comments:

Photo 7: View of entire box.

Boring:

AP1-BEDGW-002

Box:

3 of 3

Depth:

57.5' to 61.3'

Comments:

Photo 8: Close-up view of left portion of box.

Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Boring:

AP1-BEDGW-002

Box:

3 of 3

Depth:

57.5’ to 61.3’

Comments:

Photo 9: Close-up view of right portion of box.

Shaw E & I, Inc.

APPENDIX D

WELL DEVELOPMENT LOGS AND WELL DEVELOP WATER PHOTOGRAPHS

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 132457
Project Name: PBOW
Form Completed by: Brian Tiew
Well Developed by/firm: Shaw E+I

Site ID: AP1
Location ID: AP1-MW01
Date Started: 03/27/2009

Monitoring Well Information

Development Method: Surge + purge
Development Equipment: waterra pump, Honda Gen., YSI 6820 Huron water level indicator, 5/8 OD x 1/2 ID HDPE tubing

Screen Height (ft): 10
Filter pack length (ft): 12.5
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 4.61
Total depth of Well (ft): 18.90
WC = 14.29

Monitoring Well Purge Calculations

Volume of Water in Casing: Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 14.29 ft x 0.164 gal/ft = 2.34 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2 - (2)^2) = 2.62 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (12.5)ft x (2.62) gal/ft x 0.3 = 9.82 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 9.82 gal + 2.34 gal = 12.16 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
12.16	24.32	36.48	48.64	60.80

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
03/27	1335	0	4.61	Let surge at slower rate for 10 min							start surge + Purge
	1350	Just now producing water high sediment Brown									begin water purge 2000 ml/min
37 min.	1356	2	10.58	water still very dark brown							
	1400	5	13.4	High	None	Dark brown	purging full pump speed flow rate 1800 ml/min				
	1409	8	17.90	High	Dark Brn	Pump remains full speed / flow decreasing					
	1412	9	18.9	water remained dark brown / High sediment							SHUT DOWN / Dry
03/30	1350	0.0	5.11	1240.0	Brown	9.69	6.82	1.512	7.96	-2.3	START PURGE
	1350	collect sample for YSI + INCREASE Pump FULL speed									
	1400	11.0	11.78	515.5	brown (Light)	8.70	6.71	1.511	7.48	3.1	flow rate 2080 ml/min.

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: Ash Pit 1
Location ID: API-MW01
Date Started: 3/27/2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
25 min.	1410	16.0	16.9	High	DARK BROWN						flow RATE 1460 ml/min.
03/30	1415	17.0	18.1	High	DARK BROWN						Pump OFF / WELL DRY
3/31 ↓	1113	0.0	4.99		Light BROWN						START PURGE
	1117	19.0	11.90	326.0	light BROWN	9.10	6.72	1.651	7.38	3.3	~~20~~ 2240 ml/min
27 min	1121	22.0	16.35	—	light BROWN						Pump SET AT full SPEED
	1140	27.0	18.23		light BROWN	signs of clearing		SHUT DOWN/DRY			pumping continuous @ 440 ml/min.
4/1 ↓	1055	0.0	4.95		water STARTS OUT DARK BROWN						START purge
	1100	28.5	10.05	89.4	cloudy	9.78	6.71	1.718	8.27	7.5	flow RATE 920 ml/min
	1105	29.5	10.90	74.1	clearing	9.33	6.71	1.729	8.51	5.8	flow RATE 820 ml/min
37 min.	1110	31.0	11.65	107.4	cloudy	9.23	6.76	1.701	9.48	2.8	flow RATE 780 ml/min
	1115	32.0	12.95	179.3	light/BRN.	9.29	6.71	1.703	8.66	5.2	INCREASE flow 2920 ml/min
	1125	—	18.50	High	DARK / light BROWN						continue Pump full speed.
	1132	37.0	18.50	High	light/BROWN		SHUT DOWN/DRY				WELL producing 440 ml/min

Water Added: type_____ volume_____ (gal.)
Chemical Added: type_____ volume_____ (gal.)
Range and Average Discharge Rate: _____
Maximum Drawdown during Development: _____ at _____ gpm.
Disposition of Development Water: Drums Baker Tank Other
Number of Containers for Development Water: _____

Comments: NOTE: ON 11/30 @ 1140 WELL WAS producing 440ml/min @ WL 18.23 continuously for 10 min. prior to SHUT DOWN

Final Measurements (BTOC)

Total depth of Well (ft): 18.90

Date Completed: 04-01-2009

Hours Developed: 2.1 AS of 4/1

Shaw
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Well Development Log (Continuation)

Site ID: AP 1
Location ID: AP1 - MW01
Date Started: 03-27-2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/2	0915	0.0	5.20	High	light Brn	—	—	—	—	—	START Purge
	0920	38.0	10.30	49.3	cloudy	9.98	6.63	1.743	8.16	8.1	
	0923	39.0	11.10	54.7	cloudy	9.41	6.65	1.748	8.27	7.4	flowrate 1040 ml/min.
55 min	0928	42.0	12.4	102.6	cloudy	9.37	6.66	1.733	8.74	6.8	flowrate 1200 ml/min
	0933		14.4	401.9	light brown	9.46	6.69	1.713	9.85	6.0	flow rate 1100 ml/min
	1010	47.0	18.3	High	light brown	—	—	—	—	—	stop purge / Dry
4/3	1058	—	4.90	—	—	—	—	—	—	—	Start purge
	1105	47.5	7.90	67.0	clear	10.05	6.79	1.742	9.93	1.0	flow rate 600 ml/min
22 min.	1110	49.0	8.8	24.2	clear	9.49	6.76	1.762	9.96	2.3	flow rate 380 ml/min
	1115	50.5	10.90	18.4	clear	8.92	6.68	1.764	9.62	6.9	flow rate 1100 ml/min
4/3	1120	51.0	18.3		complete						increase flow full speed

increase

Water Added: type_____ volume_____ (gal.)
Chemical Added: type_____ volume_____ (gal.)
Range and Average Discharge Rate: _____
Maximum Drawdown during Development: _____ at _____ gpm.
Disposition of Development Water: Drums Baker Tank Other
Number of Containers for Development Water: _____

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 18.90

Date Completed: 04/03/2009

Hours Developed: 3.38

Shaw
Shaw E & I, Inc.

Well Development Log

Project Number: 132457
Project Name: PBOW
Form Completed by: Brian Tiell
Well Developed by/firm: Shaw E+I

Site ID: Ash Pit 1
Location ID: AP1 - MW02
Date Started: 03-27-2009

Monitoring Well Information

Development Method: Surge + Purge
Development Equipment: Waterra pump, Honda 2000 w Gen., YSI 6820, Huron - water level indicator, 5/8 OD x 1/2" ID HDPE tubing

Screen Height (ft): 10
Filter pack length (ft): 13.5
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 15.96
Total depth of Well (ft): 22.35
WC = 6.39

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 6.39 ft x 0.164 gal/ft = 1.04 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2 - (2)^2) = 2.62 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (6.39) ft x (2.62) gal/ft x 0.3 = 5.02 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 5.02 gal + 1.04 gal = 6.06 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
6.06	12.12	18.18	24.24	30.3

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
3/27 ↓	1505	0	15.96	—	—	—	—	—	—	—	—
	1530	0	16.45	water starts		clear	& slow	surge	rate		begin surge + purge
40 min.	1532	1.5	—		clear			2400 ml / min			adjust pump flow speed
	1536	2.5	20.40	15.6	clear	12.27	7.57	1.573	8.25	-42.8	
	1541	4.0	21.72		clear						SHUT DOWN WELL DRY
3/27 ↑	1545	4.0	21.17	recharge		to	slow /	move to	next	well	—
3-28 ↓	1545	4.0	18.50	—	—	—	—	—	—	—	START PURGE
8 min.	1550	6.0	20.90	11.80	clear	10.89	7.57	1.565	8.71	-43.4	flow rate 1000 ml / min
3-28 ↑	1553	6.0	21.75	—	clear	—	—	—	—	—	SHUT DOWN / DRY

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: ASH Pit 1
Location ID: AP1 - MW 02
Date Started: 03-27-2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
3/30	1510	0	17.15	Run pump at slow rate to create surge/						Low water volume	START surge + Purge
↓	1520	0	Raise tubing up 1.5' + continue surge at slow rate							—	—
42 min.	1540	6.5	18.9	27.6	clear	11.22	7.47	1.685	7.61	-39.1	flow rate 1060 ml/min.
	1545	7.0	20.72	3.5	clear	10.74	7.45	1.904	8.57	-37.2	—
	1550	7.5	21.40	1.3	clear	11.25	7.52	1.832	9.35	-40.9	—
	1552	10.0	22.05	WL = 21.55 @ 1553			WL = 21.41 @ 1558			—	Pump off / well DRY

Water Added: type_____ volume_____ (gal.)
Chemical Added: type_____ volume_____ (gal.)
Range and Average Discharge Rate: _____
Maximum Drawdown during Development: _____ at _____ gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 23.35

Date Completed: 03-30-2009

Hours Developed: 1.5

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Well Development Log

Project Number: 132457
Project Name: PBOW
Form Completed by: BRIAN Tick
Well Developed by/firm: Shaw E+I

Site ID: AP1 Ash Pit
Location ID: AP1 - MW03
Date Started: 04 - 16 - 2009

Monitoring Well Information

Development Method: Surge + purge
Development Equipment: waterra pump
Honda 2000W Generator YSI 6820
water quality meter 5/8 OD x 1/2 ID HDPE tubing Hydrow WL indicator

Screen Height (ft): 10
Filter pack length (ft): 13
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 14.53
Total depth of Well (ft): 21.87
WC - 7.34

Monitoring Well Purge Calculations

Volume of Water in Casing: Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (4)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 7.34 ft x 0.164 gal/ft = 1.20 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((64.06)^2- (4)^2) = ~~2.46~~ gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (7.34)ft x (~~2.46~~) gal/ft x 0.3 = 5.41 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 5.41 gal + 1.20 gal = 6.61 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
~~6.61~~	~~13.22~~	~~19.83~~	~~26.44~~	~~33.05~~

see CORRECTION SHEET

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/16	1723	—	14.85								start purge
	1733	1.0	15.80	134.8	light gray	11.75	7.53	0.869	5.73	-39.9	pump aggressively / full speed
28 min.	1736	2.0	17.80	382.9	gray	10.68	7.48	0.920	6.11	-35.8	cont. now pump / full speed
	1745	5.0	20.60	High	gray	—	—	—	—	—	shut down / Dry
4/17	0955	—	18.75	—	—	—	—	—	—	—	check water level
4/18	1410	—	17.39	—	—	—	—	—	—	—	begin purge
	1415	5.5	18.80	535.3	gray	14.25	7.43	0.970	8.69	-37.8	—
20 min.	1420	6.0	20.46	178.2	light gray	12.94	7.47	0.907	9.25	-39.3	—
	1430	7.5	21.35	showed signs of clearing & shut down							SHUT DOWN / DRY

Shaw
Shaw E & I, Inc.

CORRECTION SHEET

Well Development Log

Project Number: 132457
Project Name: PBOW
Form Completed by: Brian Tiew
Well Developed by/firm: Shaw E+I

Site ID: AP1
Location ID: AP1 - MW03
Date Started: 04-16-2009

Monitoring Well Information

Development Method:
Development Equipment: BT 04-23-2009

Screen Height (ft): 10
Filter pack length (ft): 13
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 14.53
Total depth of Well (ft): 21.87
WC = 7.34

Monitoring Well Purge Calculations

Volume of Water in Casing: Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 7.34 ft x 0.164 gal/ft = 1.20 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((8.25)^2- (2)^2) = 2.62 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (7.34)ft x (2.62) gal/ft x 0.3 = 5.76 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 5.76 gal + 1.20 gal = 6.96 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
6.96	13.93	20.88	27.84	34.80

Development Record

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments

BT 04-23-2009

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Well Development Log (Continuation)

Site ID: AP1 ASH PIT AREA
Location ID: AP1 - MW03
Date Started: 04-16-2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/19	1325	—	18.90		slow	Recharge attemp to recover sample					START purge
1 hr. 20min	1342	8.0	19.50	722.6	light Brown	9.98	7.81	0.997	11.52	-53.1	—
	1350	8.5	20.80	269.1	light Brown	10.57	7.59	1.021	8.10	-40.9	shut down / check recharge
	1445	10.0	20.50	try to let regenerate and collect sample							shut down NO sample
4/21	1750	—	17.84	—	—	—	—	—	—	—	START purge
0 min.	1755	10.5	20.7	64.4	semi clear	11.87	7.36	1.036	5.40	-33.5	—
	1800	12.0	21.55		collect sample for final turbidity						SHUT DOWN DRY

Water Added: type None volume — (gal.)
Chemical Added: type None volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: Dry at gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 21.87

Date Completed: 04-21-2009

Hours Developed: 2.3

Shaw
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Well Development Log

Project Number: 132 457
Project Name: PBOW
Form Completed by: Brian Tiell
Well Developed by/firm: Shaw E+I

Site ID: Ash Pit 1
Location ID: AP1 - BED ~~S~~W001
Date Started: 03-25-2009

Monitoring Well Information

WC = 32.89

Development Method: Surge + Purge
Development Equipment: Waterra pump, Honda Generator, YSI 6820, water level indicator, 1/2" ID 5/8 OD HDPE tubing

Screen Height (ft): 15'
Filter pack length (ft): 19.3'
Casing Diameter (in): 2"

Begining Measurements (BTOC)
Depth to Water (ft): 39.46 @ 1012
Total depth of Well (ft): 72.35

NOTE: Petroleum odor

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (4)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 32.89 ft x 0.164 gal/ft = 5.39 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((6")^2 - (2")^2) = 1.31 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (19.3)ft x (1.31) gal/ft x 0.3 = 7.58 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 7.58 gal + 5.39 gal = 12.97 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
12.97	25.94	38.91	51.88	64.85

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
3/25	1036	1/2 gal @ 1040	42.74	strgt clear	thru RUST COLOR	Surge	by hand	@ 1' intervals	—		1044 - set up pump
	1101	.5 gal	42.83	will	~~brown tint~~	begin	purging	aggressively	—		START purge @ 2000 ml/min.
	1111	3.5	48.80	249.6	light brown	12.02	7.98	0.438	7.31	-65.1	1520 ml/min
1 hr. 21 min	1119	5.5	62.10	water	level up	+down	(pressure)	visable	petroleum	in	water Stop pump / No water
	1134	5.5	58.30	—	—	—	—	—	—	—	Restart purge
	1137	7.5	66.70	37.4	black TINT	12.23	6.74	0.816	2.36	-270.3	2280 ml/min
	1142	10.0	73.98	31.5	clear slight TINT	11.71	6.67	1.192	0.50	-284.1	—
	1147	14.0	76.90	51.3	clear	11.73	7.44	0.660	2.05	-229.7	1560 ml/min.
3/25	1156	15.0	81.14	Bottom of well now		81.62	(feels	solid)	—		SHUTDOWN Dry

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Well Development Log (Continuation)

Site ID: PBOW - AP1
Location ID: AP1 - BEDRAWOOD
Date Started: 03/25/2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
3/25	1405	15.0	76.74	water clear w/ black tint					—	—	start purge @ 1800 ml/min
6 min.	1411	16.5	81.34	33.7	clear	12.22	7.00	3.177	3.53	-292.1	Shut down / well dry
3/29	1610	0.0	64.63	Abort high wind & down pour						STOP	BT ~~start~~ purge
3/30	0910	0.0	63.30	—	—	—	—	—	—	—	START purge
	0930	17.5	70.82	12.6	clear	9.98	6.85	10.36	3.45	-4.3	flow rate 1200ml/min
40 min.	0935	19.0	72.92	7.2	clear	9.52	6.80	9.354	2.69	-1.7.	—
	0940	21.0	74.70	8.2	clear	8.60	6.80	9.057	2.36	-1.6	flowrate 1280ml/min
3/30	0950	25.0	81.32	—	—	water remained clear through out development					SHUT DOWN / WELL DRY

Water Added: type_____ volume_____ (gal.)
Chemical Added: type_____ volume_____ (gal.)
Range and Average Discharge Rate: _____
Maximum Drawdown during Development: _____ at _____ gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments: AS OF 3/25/09 TOTAL DEVELOPEMET Time is 1 hr. 27 min.

Final Measurements (BTOC)

Total depth of Well (ft): 82.05

Date Completed: 03-30-2009

Hours Developed: 2 hrs. 7 min

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Shaw E & I, Inc.

Well Development Log

Project Number: 132457
Project Name: PBOW
Form Completed by: Brian Tiell
Well Developed by/firm: Shaw E+I

Site ID: AP 1 ASH PIT I
Location ID: AP1-BEDGW002
Date Started: 04-01-2009

Monitoring Well Information

Development Method: Surge + Purge
Development Equipment: Waterra pump, Honda 2000 W gen., YSI 6820, Huron water level indicator, 5/8" OD x 1/2" ID tubing

Screen Height (ft): 15
Filter pack length (ft): 19.3
Casing Diameter (in): 2

Begining Measurements (BTOC)
Depth to Water (ft): 58.74
Total depth of Well (ft): 62.19
WC = 3.45

Monitoring Well Purge Calculations

Volume of Water in Casing:
Gallons/foot = 0.041 x d^2, where casing diameter in inches = (0.041 x (2)^2) = 0.164 gal/ft.
Well Volume (gallons) = Water Column (ft) x Gal/ft = 3.45 ft x 0.164 gal/ft = 0.56 gallons

Volume of Water in Filter Pack:
Gallons/foot = 0.041 x (D^2 - d^2), where D is total borehole diameter in inches & d is casing diameter in inches = 0.041 x ((6")^2 - (2")^2) = 1.31 gal/ft.
Filter Pack Volume (gal) = (the less of the filter pack lenght or water column) x gal/ft x porosity (0.3) = (3.45)ft x (1.31) gal/ft x 0.3 = 1.35 gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = 1.35 gal + 0.56 gal = 1.91 gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
1.91	3.82	5.73	7.64	9.55

Development Record

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
4/1	1742	0.0	58.71	High	Coal Black →	1ST gal. then showing			some clearing		Start surge + Purge
19 min.	1757	1.5	59.70	—	Well	is gassing		200+ H2S	fumes	—	Stop well dry
4/2	1705	—	53.65	—	water	start is		clear	—	—	start purge
	1713	2.0	55.8	240.2	black	13.65	6.99	3.051	5.78	-10.6	strong sulfur smell
	1720	3.0	56.8	292.0	black	12.99	6.99	3.381	3.84	-11.0	flow 560 ml/min
33 min.	1730	5.0	60.2	128.6	black	12.46	6.99	4.125	3.89	-10.9	flow 580 ml/min
	1738	6.0	61.32	high	black	Turbidity level improving / still black					shut down / dry
4/15	1325	—	36.80	182.4	black	11.23	7.02	5.778	3.53	-11.1	start purge
	1335	7.0	43.20	↓	↓	↓	↓	↓	↓	↓	semi clear / black Tint

contin pg. 2

H_2S = 76 ppm LEL - 8% VOC - 56 ppm @ 1330 4/15/09 strong odor

Shaw
Shaw E & I, Inc.

Well Development Log (Continuation)

Site ID: AP1 ASH PIT 1
Location ID: AP1 - BCDGW 002
Date Started: 04-01-2009

Development Record (continuation)

	Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments
contin. 4/15	1345	7.5	46.60	80.9	black tint	10.13	7.00	6.070	1.78	-10.2	well casing High H_2S
2 hr. 5 min	1410	10.0	49.40	57.4	black tint	11.02	6.93	6.257	3.57	-5.6	increase pump full speed
	1530	17.0	pump full speed to pump dry. Water remained with black tint shutdown/dry								
4/17	1540	—	50.08								start purge
400 ml.	1552	18.5	53.82	10.2	clear	15.40	6.87	5.148	6.76	-2.7	770 ml/min.
	1557	20.0	55.75	29.2	clear	13.63	6.86	5.435	2.30	-2.9	
	1610	22.5	60.24	35.0	clear	13.52	6.94	6.205	4.29	-6.9	770 ml/min.
	1615	23.0	61.40	31.0	semi clear black tint	14.42	6.98	3.312	4.81	-9.0	Turbidity sample collected
	1620	—	61.80	—	—	—	SHUT	DOWN	WELL	DRY	water in sample jar darkens with age black/green

Water Added: type None volume — (gal.)
Chemical Added: type None volume — (gal.)
Range and Average Discharge Rate: —
Maximum Drawdown during Development: Dry at — gpm.
Disposition of Development Water: (Drums) Baker Tank Other
Number of Containers for Development Water: 1

Comments:

Final Measurements (BTOC)

Total depth of Well (ft): 62.17
Date Completed: 4/17/2009
Hours Developed: 3.61

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

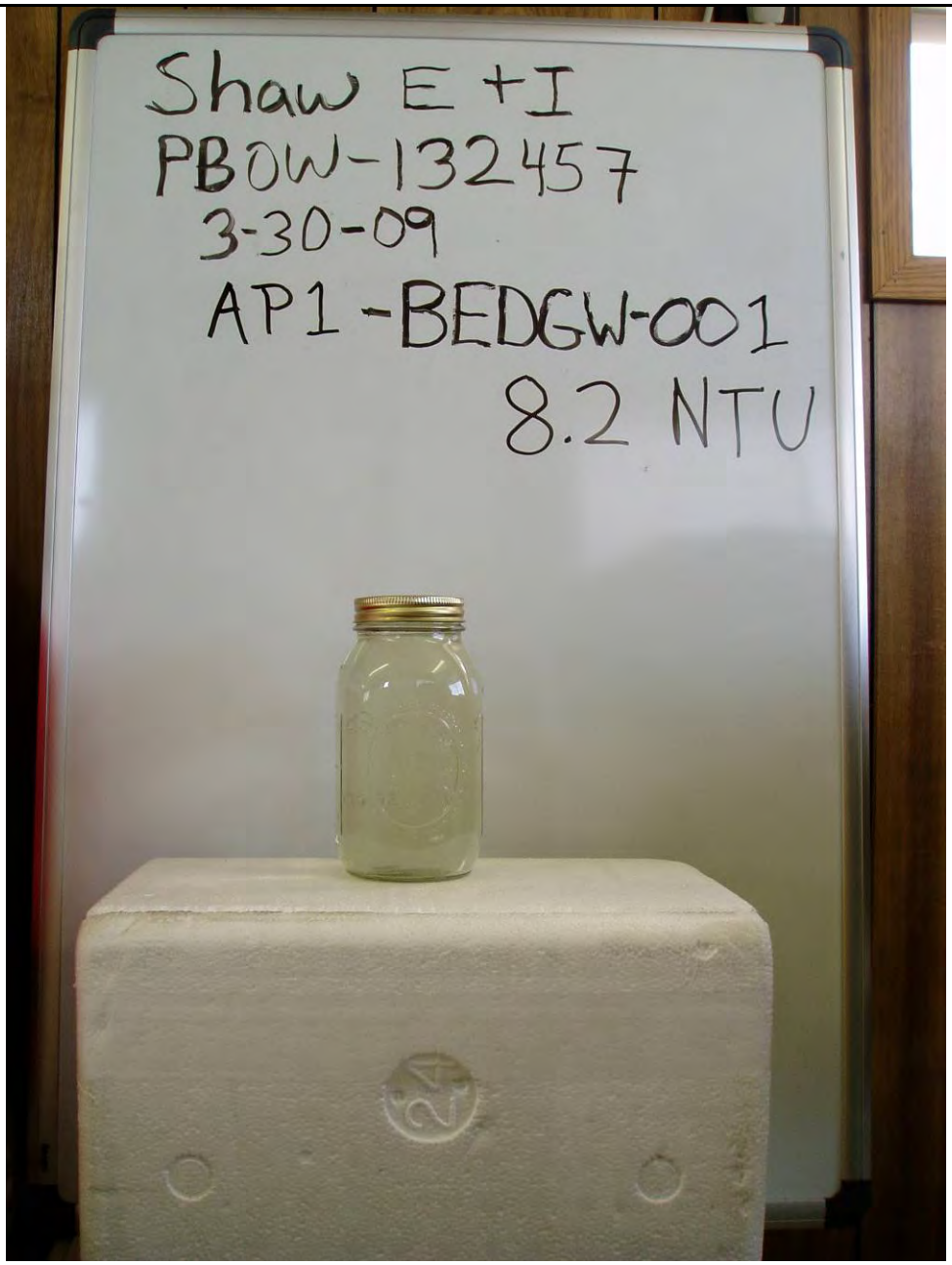
AP1-BEDGW-001

Date:

March 30, 2009

Final reading:

8.2 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

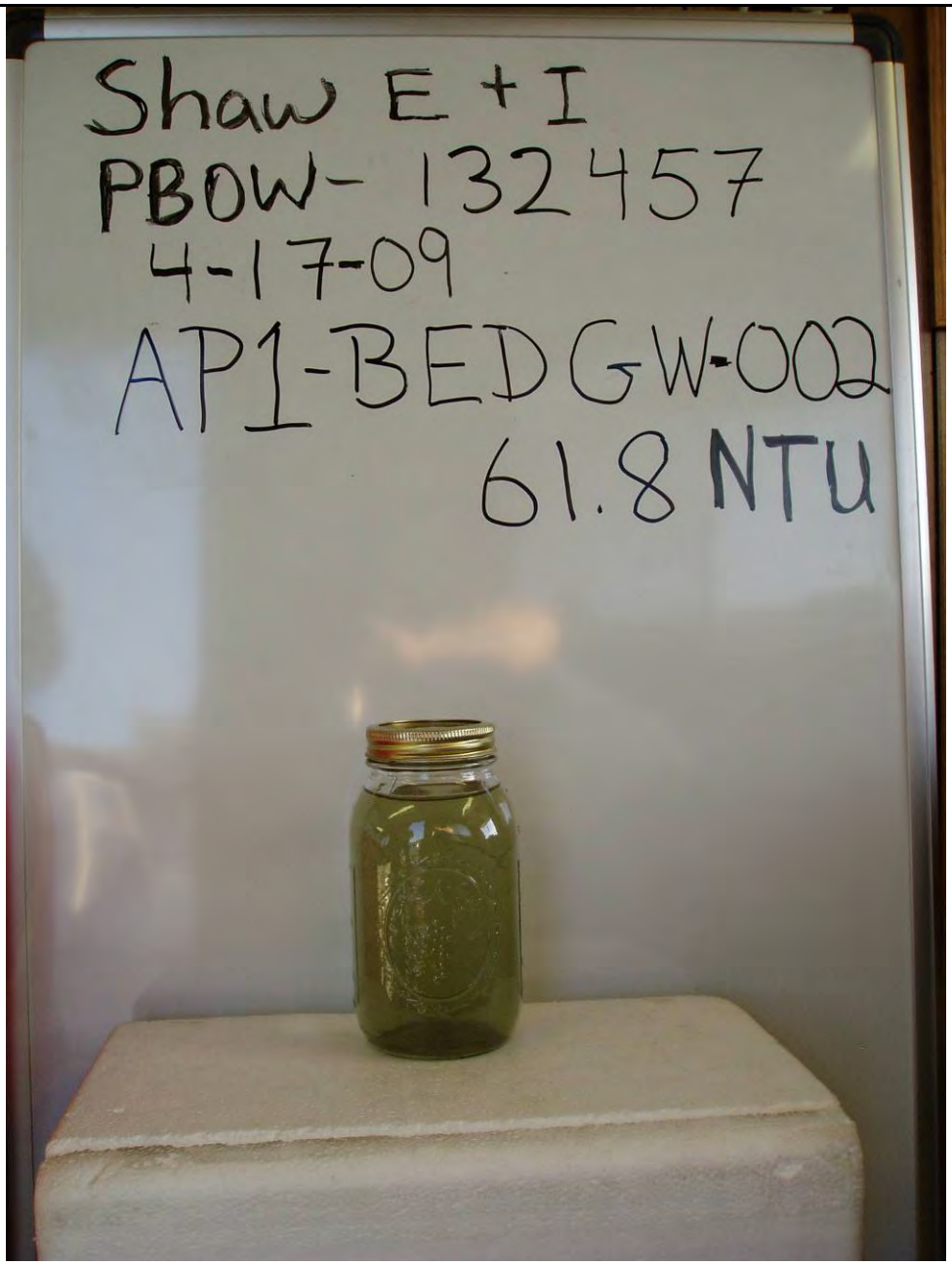
AP1-BEDGW-002

Date:

April 17, 2009

Final Reading:

61.8 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

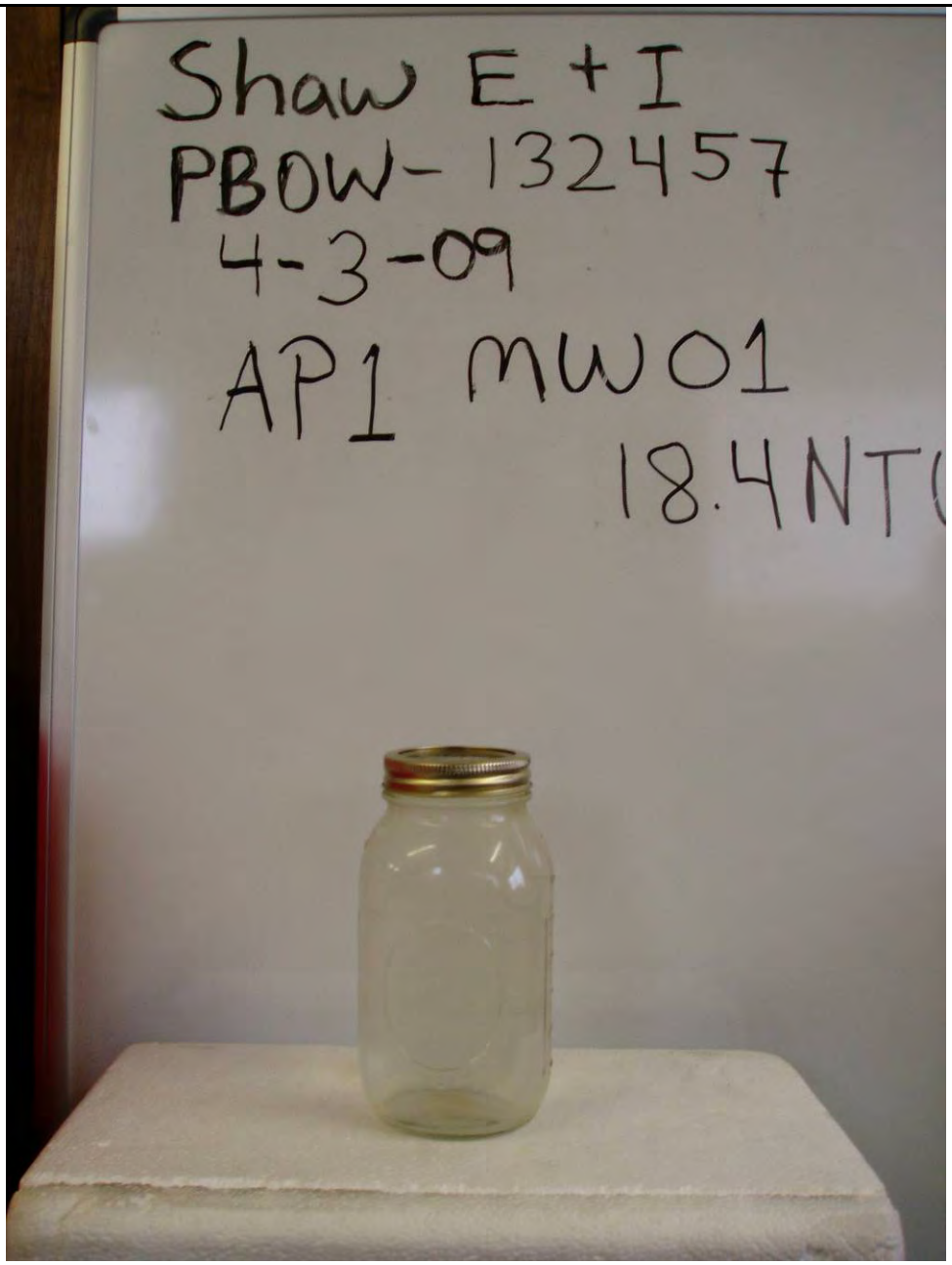
AP1-MW-01

Date:

April 3, 2009

Final Reading:

18.4 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

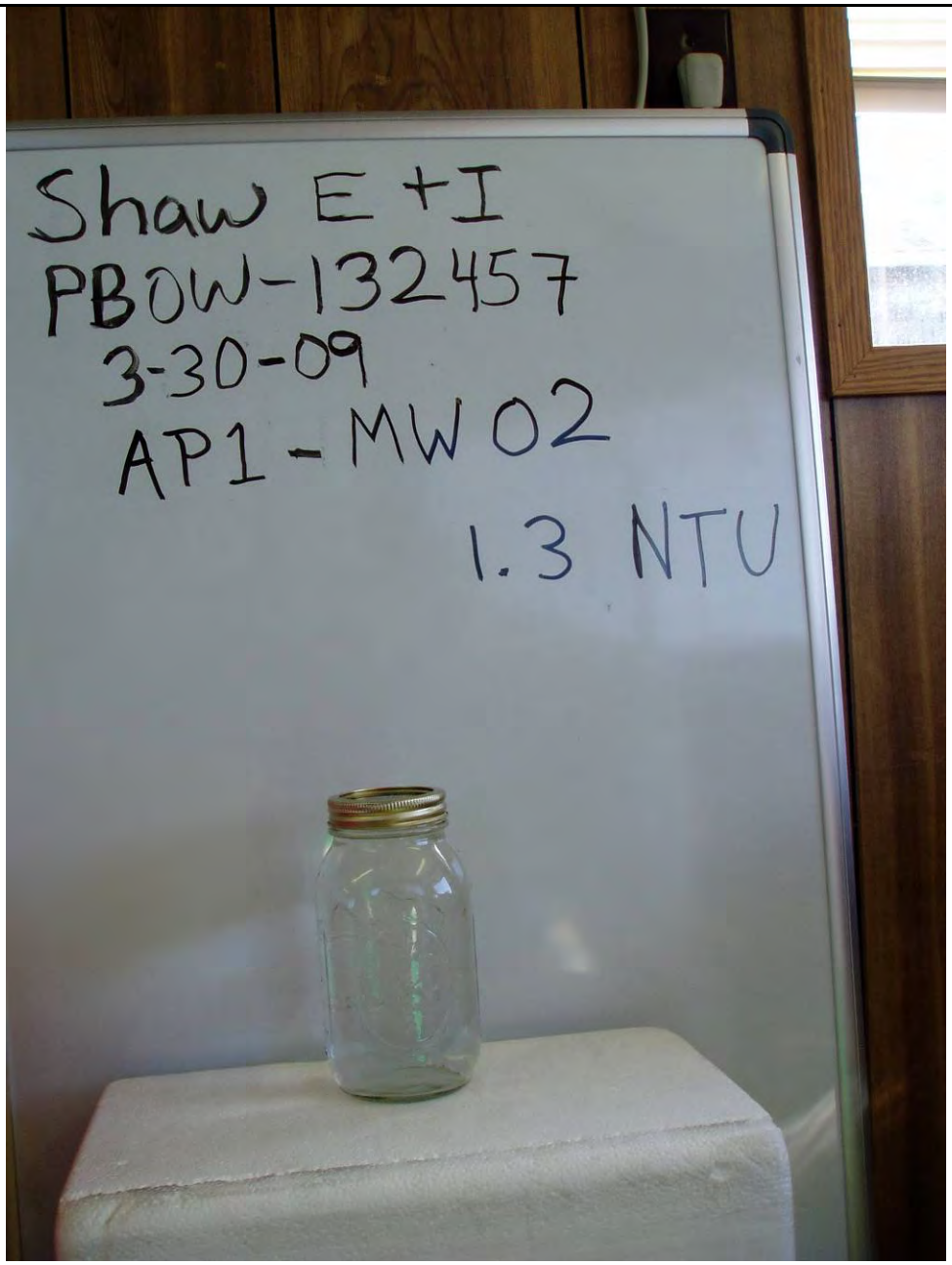
AP1-MW-02

Date:

March 30, 2009

Final Reading:

1.3 NTU



Shaw E & I, Inc.

Shaw Environmental, Inc.
Photographic Record

Client: USACE	**Project Number: 132457**
Site Name: Former Plum Brook Works	**Site Location: Sandusky, Erie County, Ohio**

Well:

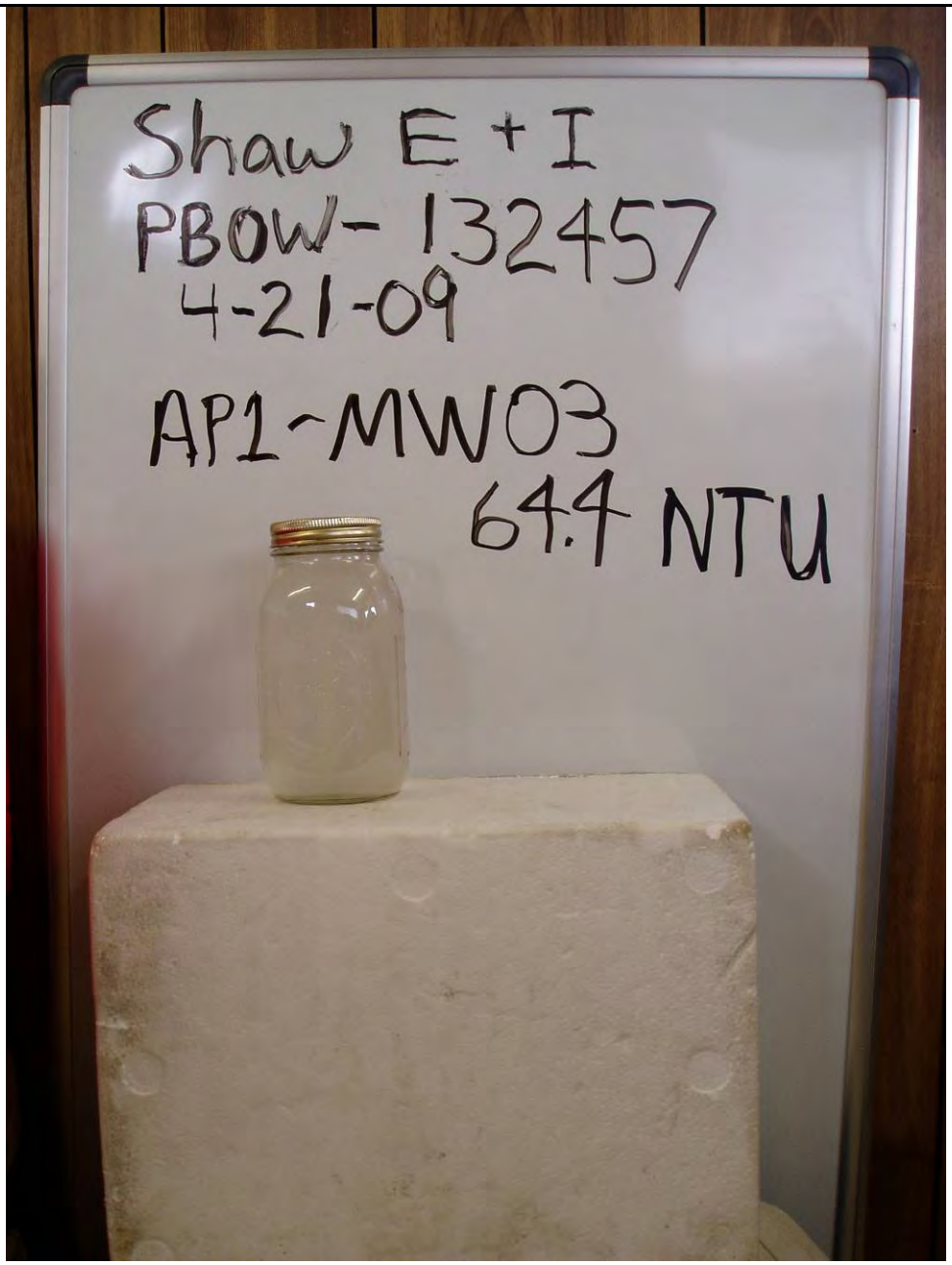
AP1-MW-03

Date:

April 21, 2009

Final Reading:

64.4 NTU



Shaw E & I, Inc.

APPENDIX E

LAND SURVEY DATA

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I (CONTRACT #W912QR-08-D-0013, D.O. DX03)
JANUARY, 2009

SUMMARY OF WORK PERFORMED

Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., located 42 soil sample and test pit locations and 43 piezometer locations at seven sites within the Plumbrook Ordnance Works site (Waste Water Treatment Plant #1, Ash Pit #1, Ash Pit #2, Wastewater Treatment Plant #2, Railcar Wash Area, Locomotive Area, and Waste Water Treatment Plant #1 Sewer Line). Work was performed on-site between 27 January, 2009 and 30 January, 2009 in accordance with Shaw E & I R.F.P. 2008-037 under purchase order #470434 OP in support of Shaw E & I contract W912QR-08-D-0013, D.O. DX03.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Steven Chris Shelton – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All soil sample and piezometer locations reported below were surveyed with a Topcon GTS-235W Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. The survey control points used in this operation were established at each site by direct static differential GPS observation using three Ashtech Promark III GPS receivers. GPS vectors were adjusted holding fixed station "PB 06" using Ashtech post-processing software, producing a least squares adjustment of the WGS 84 positions. A loop using the unadjusted vectors passing the fixed and derived control positions yields a loop precision exceeding 1 part in 100,000. Horizontal and vertical values of Sacks Surveying & Mapping control station "PB 06" were derived by GPS survey in 1996 from NGS Monuments "Skyway RM 2" and "J-318" (a first order benchmark). The horizontal datum is NAD 83. The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.9999270034. Values for Sacks Surveying & Mapping monument "PB 06" are:

Northing (y) 189,438.4289 m
Easting (x) 585,685.6292 m
Orthometric Elevation 200.5985 m
Geoid Height -35.167 m (Geoid 99)

SAMPLE LOCATIONS

Waste Water Treatment Plant #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
3	623,838.916	1,920,186.361	635.762	GPS Pt 2-100
4	624,061.542	1,920,188.546	634.731	GPS Pt 2-101
206	624,221.21	1,919,718.65	639.33 Riser	PZ-01
207			638.0 Ground	
205	624,224.51	1,919,868.74	636.86 Riser	PZ-02
204			635.4 Ground	
210	624,097.22	1,919,768.37	639.67 Riser	SB-01/PZ-06
209			637.3 Ground	
208	624,087.98	1,919,683.02	637.18	SB-02
211	624,057.52	1,919,720.80	636.61	SB-03
213	623,995.17	1,919,709.85	639.26 Riser	SB-04/PZ04
212			638.1 Ground	
214	623,971.71	1,919,679.01	638.50	SB-05
218	623,987.84	1,919,772.77	637.56	SB-06
217	623,963.70	1,919,752.47	638.94 Riser	SB-07/PZ-03
216			638.0 Ground	
215	623,869.76	1,919,685.96	639.94 Riser	SB-08/PZ-05
**			638.8 Ground	

** = measure down from riser to ground supplied by Shaw E & I

Ash Pit #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
122	623,632.54	1,918,680.82	636.00	SB-01 *
111	623,561.23	1,918,686.10	635.92	SB-02
112	623,475.30	1,918,685.16	638.41	SB-03
113	623,463.46	1,918,828.82	638.81	SB-04
116	623,455.17	1,918,962.03	638.35	SB-05
119	623,620.51	1,918,930.44	635.23	SB-06 *

* = Stake missing; field location as directed by Shaw E & I personnel

108	623,724.22	1,918,737.52	637.65 Riser	PZ-01
109			636.8 Ground	

Ash Pit #1 <cont.>

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
107	623,728.76	1,918,855.35	639.11 Riser	PZ-02
106			637.7 Ground	
104	623,715.50	1,919,025.14	640.79 Riser	PZ-03
105			638.7 Ground	
118	623,368.95	1,918,792.10	641.23 Riser	PZ-04
117			640.9 Ground	
115	623,521.04	1,918,801.67	638.30 Riser	SB-08/PZ-05
114			637.5 Ground	
121	623,585.48	1,918,735.41	635.15 Riser	SB-09/PZ-06
120			634.5 Ground	

Ash Pit #2

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
9	622,858.595	1,911,566.119	639.400	GPS Pt 5-100
10	623,115.362	1,911,626.581	638.679	GPS Pt. 5-101
516	622,819.31	1,911,245.10	632.55	SS&M Nail 516
505	623,073.14	1,911,485.20	634.97 Riser	SB-01/PZ-01
504			631.7 Ground	
520	623,041.37	1,911,260.38	630.32 Riser	SB-02/PZ-02
521			627.5 Ground	
519	622,845.22	1,911,148.24	630.69 Riser	SB-03/PZ-03
518			627.7 Ground	
512	622,789.21	1,911,348.96	633.70 Riser	SB-04/PZ-04
511			630.0 Ground	
513	622,901.66	1,911,339.77	633.97 Riser	SB-05/PZ-05
514			631.8 Ground	
508	622,942.86	1,911,404.17	633.42 Riser	SB-06/PZ-06
507	629.7 Ground			
515	622,955.41	1,911,280.43	629.46	SB-07
509	622,840.49	1,911,425.01	632.92 Riser	SB-08/PZ-07
510			629.8 Ground	

Ash Pit #3 not sampled as of this date

Waste Water Treatment Plant #3

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
7	623,379.091	1,914,915.675	637.382	GPS Pt. 4-100
8	623,522.259	1,914,911.296	637.616	GPS Pt. 4-102
401	623,646.21	1,914,907.54		SS&M Nail 401
416	623,616.33	1,914,460.24	639.66 Riser	PZ-01
417			637.2 Ground	
415	623,575.37	1,914,357.85	638.43 Riser	PZ-02
414			636.3 Ground	
413	623,442.78	1,914,322.61	637.56	SB-01
412	623,389.04	1,914,335.44	639.36 Riser	SB-02/PZ-03
411	623,388.62	1,914,335.56	637.2 Ground	
410	623,416.20	1,914,391.06	637.63	SB-03
409	623,455.74	1,914,416.30	640.12 Riser	SB-04/PZ-06
408			637.3 Ground	9 DKK
407	623,438.28	1,914,458.72	637.54 Riser	SB-05/PZ-05
**			636.9 Ground	
406	623,406.06	1,914,452.39	637.54	SB-06
405	623,377.78	1,914,453.57	639.72 Riser	SB-07/PZ-04
404			637.3 Ground	

** = measure up from ground to riser supplied by Shaw E & I

Railcar Wash Area (Acid Area)

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
130	623,882.09	1,918,943.02	638.10 Riser	PZ-01
131			635.4 Ground	
124	623,757.23	1,918,888.90	641.18 Riser	PZ-02
123			638.1 Ground	
127	623,812.43	1,918,868.73	639.85 Riser	PZ-03
126			636.5 Ground	
133	623,890.97	1,918,863.20	636.24 Riser	PZ-04
132			634.4 Ground	
125	623,800.27	1,918,892.60	637.58	SB-10
128	623,790.87	1,918,845.66	637.46	SB-12
129	623,823.32	1,918,836.69	635.39	SB-11

Locomotive Area

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
135	623,861.73	1,918,349.65	636.41	SS&M Nail 135
142	623,907.99	1,918,641.61	637.93 Riser	PZ-01
141			636.3 Ground	
148	623,862.16	1,918,467.96	640.67 Riser	PZ-02
147			637.0 Ground	
139	623,848.15	1,918,624.77	639.46 Riser	PZ-03
140			636.1 Ground	
138	623,794.37	1,918,550.21	637.50 Riser	SB-03/PZ-04
137			635.6 Ground	
149	623,880.78	1,918,509.04	640.20 Riser	PZ-05
150			637.3 Ground	
151	623,872.89	1,918,595.27	636.69	SB-04
136	623,799.16	1,918,471.15	636.35	SB-05
144	623,853.27	1,918,497.75	636.79	SB-07
145	623,852.71	1,918,515.02	636.82	SB-08
146	623,851.97	1,918,541.10	636.80	SB-09

Waste Water Treatment Plant #1 Sewer Line

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
5	624,284.373	1,923,674.317	635.700	GPS Pt. 3-100
6	624,608.356	1,923,501.823	631.977	GPS Pt. 3-102
301	624,567.58	1,923,502.38		SS&M Nail 301
336	624,601.08	1,921,712.32	628.78	~~SB-01~~ SB-09 DKK
337	624,623.89	1,921,715.45	628.65	~~SB-02~~ SB-10
304	624,517.72	1,923,563.59	632.31	Sth. Line, E. of road
306	624,515.71	1,923,522.82	632.20	Sth. Line, W. of road
305	624,522.75	1,923,560.31	632.08	Nth. Line, E. of road
307	624,568.23	1,923,492.44	632.09	Nth Line, W. of road
341	624,573.46	1,923,373.40	630.32	TP-03
326	624,577.93	1,923,102.28	631.96	TP-04
325	623,998.14	1,920,748.90	637.01	TP-21
324	624,049.00	1,921,018.16	635.54	TP-22
323	624,115.38	1,921,376.89	629.71	TP-23
322	624,170.76	1,921,675.58	632.49	TP-24
321	624,224.10	1,921,958.30	631.21	TP-25

Waste Water Treatment Plant #1 Sewer Line <cont.>

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
320	624,273.74	1,922,226.54	631.87	TP-26
316	624,335.37	1,922,550.74	633.80 Riser	TP-27/PZ-07
317			630.6 Ground	
313	624,383.06	1,922,811.74	630.29	TP-28
312	624,437.18	1,923,095.69	632.12	TP-29
309	624,484.42	1,923,339.45	632.11 Riser	TP-30/PZ-10
308			630.4 Ground	
340	624,616.65	1,921,456.57	628.93	TP-32
334	624,612.42	1,921,713.34	632.08 Riser	TP-33/PZ-03
335			629.0 Ground	
331	624,605.23	1,921,993.22	635.42	TP-34
330	624,595.15	1,922,271.99	636.48	TP-35
329	624,592.56	1,922,545.31	639.03 Riser	TP-36/PZ-05
328			635.7 Ground	
327	624,587.05	1,922,819.39	633.67	TP-37
PZ-01 not recovered at this date				
339	624,614.47	1,921,581.00	632.10 Riser	PZ-02
338			629.4 Ground	
333	624,609.33	1,921,832.45	631.01 Riser	PZ-04
332	624,609.09	1,921,832.50	629.8 Ground	
319	624,306.47	1,922,397.79	634.08 Riser	PZ-06
318	624,306.31	1,922,397.80	631.3 Ground	
315	624,360.52	1,922,687.65	633.93 Riser	PZ-08
314	624,360.83	1,922,687.71	630.9 Ground	
310	624,464.54	1,923,237.32	633.84 Riser	PZ-09
311	624,464.55	1,923,237.28	631.2 Ground	

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

March 2, 2009
Date

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I (CONTRACT #W912QR-08-D-0013, LTMP)
MAY, 2009

SUMMARY OF WORK PERFORMED

Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., located 39 monitoring wells, 1 bore hole, 4 staff gauges, and 24 surface water/sediment sample locations at seven sites within the Plumbrook Ordnance Works site (Waste Water Treatment Plant #1, Ash Pit #1, Ash Pit #2, Wastewater Treatment Plant #3, Railcar Wash Area, Locomotive Area, and Waste Water Treatment Plant #1 Sewer Line). Work was performed on-site between 18 May, 2009 and 21 May, 2009 in accordance with Shaw E & I R.F.P. 2008-037 under purchase order #499335 OP in support of Shaw E & I contract W912QR-08-D-0013, LTMP.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Steven Chris Shelton – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All monitoring well and sampling locations reported below were surveyed with a Topcon GTS-235W Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. The survey control points used in this operation were previously established (January, 2009) at each site by direct static differential GPS observation using three Ashtech Promark III GPS receivers. GPS vectors were adjusted holding fixed station "PB 06" using Ashtech post-processing software, producing a least squares adjustment of the WGS 84 positions. A loop using the unadjusted vectors passing the fixed and derived control positions yields a loop precision exceeding 1 part in 100,000. Horizontal and vertical values of Sacks Surveying & Mapping control station "PB 06" were derived by GPS survey in 1996 from NGS Monuments "Sky D" and "J-318" (a first order benchmark). The horizontal datum is NAD 83. The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.9999270034. Values for Sacks Surveying & Mapping monument "PB 06" are:

Northing (y) 189,438.4289 m
Easting (x) 585,685.6292 m
Orthometric Elevation 200.5985 m
Geoid Height -35.167 m (Geoid 99)

SAMPLE LOCATIONS

Waste Water Treatment Plant #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
3	623,838.916	1,920,186.361	635.762	GPS Pt 2-100
4	624,061.542	1,920,188.546	634.731	GPS Pt 2-101
2047	624,015.57	1,919,560.22	639.40 Riser	WTP1-MW01
2048			639.90 Casing	
2046			637.16 Concrete Pad	
2045			636.6 Ground	
2037	623,971.13	1,919,757.79	640.24 Riser	WTP1-MW02
2036			640.64 Casing	
2035			638.02 Concrete Pad	
2034			638.6 Ground	
2029	623,975.45	1,919,998.27	639.68 Riser	WTP1-MW03
2028			640.19 Casing	
2027			637.46 Concrete Pad	
2026			637.0 Ground	
2053	624,011.89	1,919,564.07	636.8	Borehole at proposed WTP1-BEDGW-001
2041	623,957.54	1,919,747.58	640.35 Riser	WTP1-BEDGW-002
2040			640.72 Casing	
2039			638.18 Concrete Pad	
2038			637.8 Ground	
2033	623,962.13	1,919,998.14	639.93 Riser	WTP1-BEDGW-003
2032			640.41 Casing	
2031			637.56 Concrete Pad	
2030			637.1 Ground	
2052	624,243.79	1,919,831.93	631.8	WTP1-SDW01
2049	624,248.32	1,919,717.17	631.8	WTP1-SDW02
2056	624,006.22	1,919,446.79	633.4	WTP1-SDW03
2059	623,929.66	1,919,432.72	634.2	WTP1-SDW04
2051	624,250.91	1,919,716.51	636.11 Top/Pipe	WTP1-SG01
2050			631.7 Creek Bottom	

Ash Pit #1

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
2150	623,372.09	1,918,800.20	642.93 Riser	AP1-MW01
2149			643.42 Casing	
2148			640.69 Concrete Pad	
2147			640.3 Ground	
2081	623,622.45	1,918,730.13	638.01 Riser	AP1-MW02
2080			638.45 Casing	
2079			635.02 Concrete Pad	
2078			634.7 Ground	
2072	623,723.44	1,918,747.06	639.06 Riser	AP1-MW03
2071			639.54 Casing	
2070			636.65 Concrete Pad	
2069			636.5 Ground	
2145	623,369.01	1,918,892.38	644.28 Riser	AP1-BEDGW-001
2144			644.62 Casing	
2143			641.95 Concrete Pad	
2142			641.8 Ground	
2077	623,620.90	1,918,741.22	637.16 Riser	AP1-BEDGW-002
2076			637.52 Casing	
2075			634.63 Concrete Pad	
2074			634.5 Ground	
2088	623,399.02	1,918,443.98	627.5	AP1-SDW01
2087	623,471.38	1,918,494.34	627.8	AP1-SDW02
2084	623,612.61	1,918,583.19	627.1	AP1-SDW03
2073	623,617.03	1,918,760.43	633.6	AP1-SDW04

Ash Pit #2

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
9	622,858.595	1,911,566.119	639.400	GPS Pt 5-100
10	623,115.362	1,911,626.581	638.679	GPS Pt. 5-101
516	622,819.31	1,911,245.10	632.55	SS&M Nail 516
2159	622,866.25	1,911,550.02	640.94 Riser	AP2-MW01
2158			641.39 Casing	
2157			638.41 Concrete Pad	
2156			638.2 Ground	
2167	622,892.79	1,911,351.16	635.53 Riser	AP2-MW02
2166			635.92 Casing	
2165			632.75 Concrete Pad	
2164			632.5 Ground	
2177	622,973.78	1,911,157.35	632.16 Riser	AP2-MW03
2176			632.45 Casing	
2175			629.84 Concrete Pad	
2174			629.5 Ground	
2173	622,795.83	1,911,202.97	633.46 Riser	AP2-BEDGW-001
2172			633.88 Casing	
2171			630.50 Concrete Pad	
2170			630.4 Ground	
2163	622,887.85	1,911,361.47	635.58 Riser	AP2-BEDGW-002
2162			636.07 Casing	
2161			632.77 Concrete Pad	
2160			632.4 Ground	
2155	623,117.29	1,911,619.32	640.83 Riser	AP2-BEDGW-003
2154			641.17 Casing	
2153			638.57 Concrete Pad	
2152			638.4 Ground	
2190	623,503.16	1,911,303.54	621.2	AP2-SDW01
2187	623,268.84	1,911,230.43	621.8	AP2-SDW02
2184	623,145.14	1,911,134.90	621.8	AP2-SDW03
2193	622,772.78	1,910,936.54	623.1	AP2-SDW04
2194	622,484.96	1,910,811.50	623.0	AP2-SDW05
2189	623,270.04	1,911,226.61	625.46 Top/pipe	AP2-SG04
2188			621.1 Creek Bottom	

Ash Pit #3 not sampled as of this date

Waste Water Treatment Plant #3

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
7	623,379.091	1,914,915.675	637.382	GPS Pt. 4-100
8	623,522.259	1,914,911.296	637.616	GPS Pt. 4-102
401	623,646.21	1,914,907.54		SS&M Nail 401
2215	623,391.43	1,914,527.69	640.00 Riser	WTP3-MW01
2214			640.39 Casing	
2213			637.21 Concrete Pad	
2212			637.0 Ground	
2203	623,447.80	1,914,416.55	640.91 Riser	WTP3-MW02
2202			641.36 Casing	
2201			638.04 Concrete Pad	
2200			637.7 Ground	
2207	623,501.39	1,914,372.79	637.90 Riser	WTP3-MW03
2206			638.40 Casing	
2205			635.72 Concrete Pad	
2204			635.6 Ground	
2218	623,382.22	1,914,531.86	640.15 Riser	WTP3-BEDGW-001
2219			640.64 Casing	
2217			637.30 Concrete Pad	
2216			637.1 Ground	
2199	623,453.92	1,914,407.33	640.9 Riser	WTP3-BEDGW-002
2198			641.38 Casing	
2197			638.02 Concrete Pad	
2196			637.6 Ground	
2222	623,532.48	1,914,302.59	640.21 Riser	WTP3-BEDGW-003
2223			640.66 Casing	
2221			637.43 Concrete Pad	
2220			637.1 Ground	
2225	623,513.33	1,914,357.28	630.6	WTP3-SDW01
2224	623,415.50	1,914,298.15	632.5	WTP3-SDW02
2226	623,667.10	1,914,369.86	629.76	WTP3-SDW03
2211	623,748.43	1,914,383.75	631.00 Top/Pipe	WTP3-SG03
2210			627.3 Creek Bottom	

Railcar Wash Area (Acid Area)

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
2064	623,724.69	1,919,029.45	641.01 Riser	RCA-MW01
2063			641.44 Casing	
2062			638.63 Concrete Pad	
2061			638.4 Ground	
2124	623,826.40	1,918,834.02	638.15 Riser	RCA-MW02
2123			638.59 Casing	
2122			635.52 Concrete Pad	
2121			635.3 Ground	
2128	623,865.52	1,918,827.90	638.16 Riser	RCA-MW03
2127			638.53 Casing	
2126			635.71 Concrete Pad	
2125			635.3 Ground	
2068	623,709.77	1,919,022.35	641.02 Riser	RCA-BEDGW-001
2067			641.38 Casing	
2066			638.83 Concrete Pad	
2065		638.5 Ground		
2120	623,832.46	1,918,842.57	638.03 Riser	RCA-BEDMW-002
2119			638.42 Casing	
2118			635.71 Concrete Pad	
2117			635.5 Ground	
2108	623,916.92	1,918,767.69	637.00 Riser	RCA-BEDGW-003
2107			637.46 Casing	
2106			634.80 Concrete Pad	
2105			634.3 Ground	

Locomotive Area

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
1	623,657.242	1,919,113.236	639.873	GPS Pt. 1-100
2	623,667.454	1,918,690.125	638.297	GPS Pt. 1-101
135	623,861.73	1,918,349.65	636.41	SS&M Nail 135
2112	623,937.12	1,918,462.09	639.86 Riser	LBA-MW01
2111			640.35 Casing	
2110			637.61 Concrete Pad	
2109			637.2 Ground	
2098	623,827.44	1,918,628.33	639.25 Riser	LBA-MW02
2097			639.71 Casing	
2096			636.39 Concrete Pad	
2095			635.9 Ground	
2104	623,788.63	1,918,684.59	638.18 Riser	LBA-MW03
2103			638.70 Casing	
2102			635.71 Concrete Pad	
2101			635.5 Ground	
2116	623,937.80	1,918,452.89	639.74 Riser	LBA-BEDGW-001
2115			640.23 Casing	
2114			637.65 Concrete Pad	
2113			637.3 Ground	
2094	623,827.05	1,918,614.64	638.62 Riser	LBA-BEDGW-002
2093			639.00 Casing	
2092			636.39 Concrete Pad	
2091			636.3 Ground	
2140	624,006.50	1,918,888.18	626.4	LBA-SDW01
2136	623,880.05	1,918,796.17	627.4	LBA-SDW02
2129	623,829.34	1,918,766.27	626.9	LBA-SDW03
2133	623,782.26	1,918,733.17	627.0	LBA-SDW04
2083	623,719.16	1,918,654.72	627.8	LBA-SDW05
2082	623,716.02	1,918,803.56	630.4	LBA-SDW06
2132	623,815.14	1,918,768.04	632.1 Water level	LBA-SW07
2131			631.1 Pipe invert	
2137	623,939.77	1,918,834.41	627.7	WSD-5
2138	623,781.72	1,918,728.51	630.65 Top/Pipe	LBA-SG05
2139			626.3 Creek Bottom	

Waste Water Treatment Plant #1 Sewer Line

SS&M ID#	Northing (y)	Easting (x)	Elevation	Shaw Designation
5	624,284.373	1,923,674.317	635.700	GPS Pt. 3-100
6	624,608.356	1,923,501.823	631.977	GPS Pt. 3-102
301	624,567.58	1,923,502.38		SS&M Nail 301
2004	624,190.42	1,922,785.52	634.66 Riser	1SLA-MW01
2003			635.11 Casing	
2002			631.85 Concrete Pad	
2001			631.7 Ground	
2012	624,354.65	1,922,688.56	633.93 Riser	1SLA-MW02
2011			634.57 Casing	
2010			630.92 Concrete Pad	
2009			630.8 Ground	
2020	624,654.19	1,922,564.69	639.71 Riser	1SLA-MW03
2019			640.10 Casing	
2018			636.92 Concrete Pad	
2017			636.7 Ground	
2008	624,129.03	1,922,624.33	636.14 Riser	1SLA-BEDGW-001
2007			636.59 Casing	
2006			633.41 Concrete Pad	
2005			633.0 Ground	
2016	624,368.22	1,922,687.20	634.16 Riser	1SLA-BEDGW-002
2015			634.56 Casing	
2014			631.21 Concrete Pad	
2013			630.9 Ground	
2024	624,696.73	1,922,811.24	636.74 Riser	1SLA-BEDGW-003
2023			637.16 Casing	
2022			634.41 Concrete Pad	
2021			634.0 Ground	

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

June 22, 2009

Date

APPENDIX F

IDW WASTE MANIFESTS
(APRIL, MAY, JUNE, SEPTEMBER, DECEMBER 2009)

**** All manifests may or may not be appropriate for disposal of wastes at Powerhouse 2 Ash Pits. Documentation of the waste generation location was not made, only the gross weight. Therefore, all manifests generated are included to document all disposal activities.**

006184141JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 800424 9300
4. Manifest Tracking Number: 006184141 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROCK STATION, 6100 COLUMBUS AVE, SANDUSKY OH 44870

Generator's Site Address (if different than mailing address): 6100 COLUMBUS AVE, SANDUSKY OH 44870

Generator's Phone: ~~(216) 642-0807~~ 419-621-3234

6. Transporter 1 Company Name: Triad Transport, Inc. — U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC, 1923 FREDERICK, DETROIT, MI 48211 — U.S. EPA ID Number: MID 980 991 662

Facility's Phone: (313) 947 1300

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED WATER	71	DM	55,500	~~500~~ P	NONE
	2. UN, NON DOT HAZARDOUS, NON RCRA REGULATED SOIL	8	DM	4800	~~600~~ P	NONE
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01 D098220DET / NON HAZARDOUS IDW WATER 02 D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA Manifest tracking number N09031

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of the consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower — Signature: Amy L. Bower — Month 04 Day 29 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: DAVE GALL — Signature: Dave Gall — Month 04 Day 29 Year 09

Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Royal Wood — Signature — Month Day Year

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184141551K have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

006184137JJK

Form Approved. OMB No. 2050-0039

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 800 424-9300
4. Manifest Tracking Number: 006184137 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY OH 44870

Generator's Site Address (if different than mailing address): 6100 COLUMBUS AVE
SANDUSKY, OH 44870

Generator's Phone: ~~[illegible]~~ alt 419-621-3294

6. Transporter 1 Company Name: Triad Transport Inc.
U.S. EPA ID Number: OKD 981588791

7. Transporter 2 Company Name
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC
1923 FREDERICK
DETROIT, MI 48211
U.S. EPA ID Number: MID 980 991 556

Facility's Phone: (313) 347-1300

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	63	DM	32,720	P	029L D.G.		
	2. UN NON DOT HAZARDOUS NON RCRA REGULATED Soil	17	DM	10,200	P	NONE D.G.		
	3.							
	4.							

14. Special Handling Instructions and Additional Information
01. D098220DET / NON HAZARDOUS IDW WATER 02. D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA Tracking number N09032

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower
Signature: Amy L. Bower
Month 04 Day 30 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE GOLL
Signature: Dave Goll
Month 4 Day 30 Year 09

Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
U.S. EPA ID Number

18b. Alternate Facility (or Generator)
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya Stewart
Signature
Month Day Year 04 30 09

GENERATOR | INTL | TRANSPORTER | DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184137 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: Mark Hudson

On behalf of EQ Detroit, Inc.

006184138JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: 8004249300
4. Manifest Tracking Number: 006184138 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: ~~(218) 842-0891~~ 419-621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 568

9a. HM	9b. U.S. DOT Description (Including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
	1 UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	60	DM	23,000	P	D29L		
	2 UN, NON DOT HAZARDOUS, NON RCRA REGULATED Soil	20	DM	18,000	P	NONE		
	3							
	4.							

14. Special Handling Instructions and Additional Information:
01 D098220DET / NON HAZARDOUS IDW WATER 02. D098221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER: 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA tracking number N09033

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of the consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Amy L. Bower
Signature: Amy L. Bower
Month Day Year: 05 01 09

16. International Shipments: ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Dave Gall
Signature: Dave Gall
Month Day Year: 05 01 09
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year:

18. Discrepancy
18a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator):
U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator):
Month Day Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tony Stewart
Signature:
Month Day Year: 05 01 09

GENERATOR / INT'L / TRANSPORTER / DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete

DESIGNATED FACILITY TO GENERATOR STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184138 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

006184139JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OHS 800 015 370
2. Page 1 of: 1
3. Emergency Response Phone: 800-424-9300
4. Manifest Tracking Number: 006184139 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: ~~(810) 842-0991~~ 419-621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: Triad Trucking Company — U.S. EPA ID Number:
7. Transporter 2 Company Name: — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC.
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 586

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Water	56	DM	28,000 est	lbs	D009L
	2. UN, NON DOT HAZARDOUS, NON RCRA REGULATED Soil	2	DM	1,000 est	lbs	NONE
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01. D009220DET / NON HAZARDOUS IDW WATER 02. D009221DET / NON HAZARDOUS SOIL
24 HOUR EMERGENCY RESPONSE NUMBER: 1-800-424-9300 PROVIDED BY SHAW E & I VIA CONTRACT WITH CHEMTREC. NASA - N09054

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. — Signature: Robert F. Lallier on behalf of Director, GRL — Month 5 Day 5 Year 09

16. International Shipments: ☐ Import to U.S. ☐ Export from U.S. — Port of entry/exit: — Transporter signature (for exports only): — Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE BALL — Signature: Dave Ball — Month 05 Day 05 Year 09
Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Danielle Edwards — Signature: Danielle Edwards — Month 05 Day 05 Year 09

GENERATOR — INTL — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO GENERATOR STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 006184139 have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

000310559FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH380001537 9
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310559 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non Dot Hazardous, Non RCRA Regulated	19	DM	15,200	lbs P	None
	2. UN, Non Dot Hazardous, Non RCRA Regulated	59	DM	23,600	lbs P	0291
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/ Non Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert F. Lallier on behalf of Director, GRC
Month Day Year: 06 16 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr.
Signature: Benjamin D. Rhoads Sr.
Month Day Year: 06 16 09
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year:

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
OK to change sec. 12 line 1 & 2 per Beth Crawford 6/16/09
Manifest Reference Number:
18b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya C. Stewart
Signature:
Month Day Year: 06 16 09

GENERATOR / INT'L / TRANSPORTER / DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 000310559FLE have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____

On behalf of EQ Detroit, Inc.

000310584FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3800015379
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310584 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc.
U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
EQ Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: MID980991566

9a HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non Dot Hazardous, Non RCRA Regulated		DM			
	2. UN, Non Dot Hazardous, Non RCRA Regulated	56	DM	22,400	lbs	029L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/Non Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert F. Lallier on behalf of Director, GRC
Month 06 Day 17 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr.
Signature: Benjamin D. Rhoads Sr.
Month 06 Day 17 Year 09
Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18b
Printed/Typed Name: Tonya C. Stewart
Signature
Month 06 Day 17 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

000310583FLE

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
OH3800015379	1	1-800-424-9300	000310583 FLE

5. Generator's Name and Mailing Address
NASA-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: Triad Transport, Inc. — U.S. EPA ID Number: OKD981588791

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ, Detroit, Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300 — U.S. EPA ID Number: MID980991566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt/Vol	13. Waste Codes
	1. UN, Non Dot Hazardous, Non RCRA Regulated	22	DM	17,600	P	
	2. UN, Non Dot Hazardous, Non RCRA Regulated	20	DM	8,000	P	0291
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. D098221DET/ Non-Hazardous Soil 2. D098220DET/ Non Hazardous IDW Water
XX 24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. — Signature: Robert F. Lallier Jr. on behalf of Pinnacle GRC — Month 6 Day 18 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Benjamin D. Rhoads Sr. — Signature: Benjamin D. Rhoads Sr. — Month 06 Day 18 Year 09
Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Tonya L. Howard — Signature: — Month 06 Day 18 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 000310583FLE have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

000310538FLE

Form Approved. OMB No 2050-0039

Please print or type (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3800015379
2. Page 1 of 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310538 FLE

5. Generator's Name and Mailing Address: Nasa-Plumbrook Station, 6100 Columbus Ave., Sandusky, OH 44870

Generator's Site Address (if different than mailing address): 6100 Columbus Ave., Sandusky, OH 44870

Generator's Phone: ~~216-642-0891~~ 419.621-3234

6. Transporter 1 Company Name: EQ Industrial Services — U.S. EPA ID Number: MID 000 263 871

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ, Detroit, Inc., 1923 Frederick, Detroit, MI 48211 — U.S. EPA ID Number: MID980991566

Facility's Phone: 313-347-1300

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number and Packing Group (if any))	10. Containers No	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non DOT Hazardous, Non-RCRA Regulated	~~X~~ 3 CDS	D M	1,000 ~~150~~ est.	P	None
	2. UN, Non Dot Hazardous, Non-RCRA Regulated	~~X~~ 4	D M	210 est.	G	D29L
	3.					
	4.					

14. Special Handling Instructions and Additional Information
9a1) D098221DET/ Non-Hazardous Soil 9a2) D098220DET/ Non-Hazardous IDW Water
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. — Signature: Robert F. Lallier Jr. — Month 9 Day 10 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: Date leaving U.S.:
Transporter signature (for exports only):

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Raymond Root — Signature: Raymond Root — Month 09 Day 10 Year 09
Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H111 2. H111 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: David Patton — Signature: [signature] — Month 09 Day 10 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EQ Detroit, Inc.

1923 FREDERICK STREET • DETROIT, MICHIGAN 48211 • tel 313-923-0080 • fax 313-923-3375 • www.eqonline.com

CERTIFICATE OF RECEIPT

This certificate is to verify that the wastes specified on manifest # 000310538FLE have been properly received at EQ Detroit and will be properly managed to meet all applicable local, state and federal standards.

FACILITY NAME:	EQ Detroit, Inc. EPA ID # MID 980991566
ADDRESS:	1923 Frederick Street Detroit, MI 48211
PHONE NUMBER:	313-923-0080 800-495-6059
FAX NUMBER:	313-923-3375

Authorized Signature: _____
On behalf of EQ Detroit, Inc.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3800015379
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310647 FLE

Generator's Name and Mailing Address: Isa-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address): 6100 Columbus Ave.
Sandusky, OH 44870

5. Transporter 1 Company Name: EQ Industrial Services — U.S. EPA ID Number: MI0000263871

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Wayne Disposal, Inc.
49350 North I-94 Service Drive.
Belleville, MI 48111
Facility's Phone: 1-800-592-5489 — U.S. EPA ID Number: MID048090633

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. NA3077, Hazardous Waste Solid, n.o.s. (2,4-Dinitrotoluene) 9, PG III	4	DM	2400	P	D030		
	2.							
	3.							
	4.							

Special Handling Instructions and Additional Information

9a1) Approval #: L098097WDI-OTS ERG #: 171
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec
NASA# 09012

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. — Signature: Robert F. Lallier on behalf of Director, GRC — Month 12 Day 17 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAYLE BLAIR — Signature: Dayle Blair — Month 12 Day 17 Year 09
Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name — Signature — Month Day Year

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Land Disposal Restriction & Certification Form

Please check the appropriate facility:

☐ Michigan Disposal Waste Treatment Plant	49350 N. I-94 Service Drive, Belleville, MI 48111	EPA ID # MID 000 724 831
☒ Wayne Disposal, Inc. Site #2 Landfill	49350 N. I-94 Service Drive, Belleville, MI 48111	EPA ID # MID 048 090 633
☐ EQ Detroit, Inc.	1923 Frederick Street, Detroit, MI 48211	EPA ID # MID 980 991 566
☐ EQ Resource Recovery, Inc.	36345 Van Born Road, Romulus, MI 48174	EPA ID # MID 060 975 844
☐ EQ North Carolina	1005 Investment Blvd, Apex, NC 27502	EPA ID # NCD 982 170 292
☐ EQ Florida, Inc.	7202 East 8th Ave, Tampa, FL 33619	EPA ID # FLD 981 932 494

Generator Name: NASA - Plumbrook **U.S. EPA ID No.:** OH3800015379

Generator Address: 6100 Columbus Ave Sandusky, OH 44870

State Manifest No.: _____ **Manifest Doc. No.:** 000310647 FLE

Instructions

Column 1: Identify all U.S. EPA hazardous waste codes that apply to this waste shipment.
Column 2: Choose the appropriate treatability group: Non-Wastewater (NWW) or Wastewater (WW).
Column 3: Enter the appropriate Subcategory, if applicable. Also enter "Contaminated Soil" or "Debris" if the waste will be treated using one of the alternative treatment technologies provided by 40 CFR 268.49 (c) – soil, or 40 CFR 268.45 – debris.
Column 4: Enter the letter of the appropriate paragraph from pages 1-2 of this form.
Column 5: For F001 – F005, F039, D001 – D043, Debris and Contaminated Soil: please enter the Reference Number(s) for any constituents in your waste stream subject to treatment. The Reference Number(s) can be found in the EQ Resource Guide, LDR/UHC Constituent Table.

Manifest Line Item	U.S. EPA Hazardous Waste Code (s)	NWW or WW	Subcategory	How Must the Waste be Managed?	Reference Number(s) of Hazardous Constituents contained in the waste. Complete for F001-F005, F039, D001-D043, Soil and Debris wastes.
9a ~~11A~~	D030	NWW	—	D	D030
11B					
11C					
11D					

I hereby certify that all information submitted on this and all associated documents is complete and accurate to the best of my knowledge and information.

Generator Signature: Robert F. Lallier **Title:** Env Manager

Printed Name: Robert F. Lallier Jr. **Date:** 12/17/09

How Must the Waste Be Managed?

S. THIS CONTAMINATED SOIL *DOES* / *DOES NOT* (CIRCLE ONE) CONTAIN LISTED HAZARDOUS WASTE AND *DOES* / *DOES NOT* (CIRCLE ONE) EXHIBIT A CHARACTERISTIC OF HAZARDOUS WASTE AND *IS SUBJECT TO* / *COMPLIES WITH* (CIRCLE ONE) THE SOIL TREATMENT STANDARDS AS PROVIDED BY 268.49(c) OR THE UNIVERSAL TREATMENT STANDARDS. I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

000310647 FLE

Land Disposal Restriction & Certification Form

A. THIS RESTRICTED WASTE REQUIRES TREATMENT TO THE APPLICABLE STANDARD. This waste must be treated to the applicable performance based treatment standard set forth in 40CFR Part 268 Subpart C and Subpart D, 268.40 or RCRA Section 3004(d) prior to land disposal.

B. THIS HAZARDOUS DEBRIS IS SUBJECT TO THE ALTERNATIVE TREATMENT STANDARDS OF 40 CFR 268.45.

C. THIS RESTRICTED WASTE HAS BEEN TREATED TO THE PERFORMANCE STANDARDS. I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

D. THIS RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT TREATMENT. I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR part 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

E. THIS LAB PACK DOES NOT CONTAIN ANY WASTES IDENTIFIED AT APPENDIX IV TO PART 268. I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only wastes that have not been excluded under appendix IV to 40 CFR part 268 and that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of fine or imprisonment.

F. THIS RESTRICTED WASTE HAS BEEN TREATED TO REMOVE THE HAZARDOUS CHARACTERISTIC AND CONTAINS UNDERLYING HAZARDOUS CONSTITUENTS THAT REQUIRE FURTHER TREATMENT TO MEET THE UNIVERSAL TREATMENT STANDARDS. I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

G. THIS RESTRICTED WASTE HAS BEEN TREATED TO REMOVE THE HAZARDOUS CHARACTERISTIC AND BEEN TREATED FOR UNDERLYING HAZARDOUS CONSTITUENTS. I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic and that underlying hazardous constituents, as defined in §268.2(i) have been treated on-site to meet the §268.48 Universal Treatment Standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment..

H. THIS RESTRICTED WASTE IS SUBJECT TO AN EXEMPTION FROM LAND DISPOSAL. *(Please include the date the waste is subject to the prohibitions in Column 5)* This waste is subject to an exemption from a prohibition on the type of land disposal method utilized for the waste (such as, but not limited to, a case-by-case extension under 40 CFR Part 268.5, an exemption under 40 CFR 268.6, or a nationwide capacity variance under 40 CFR 269 Subpart C)

I. THIS RESTRICTED WASTE WITH TREATMENT STANDARDS EXPRESSED AS CONCENTRATIONS IN THE WASTE PURSUANT TO 268.43, IF COMPLIANCE WITH THE TREATMENT STANDARDS IN SUBPART D OF THIS PART IS BASED IN PART OR IN WHOLE ON THE ANALYTICAL DETECTION LIMIT ALTERNATIVE IN 268.439(c). I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the nonwastewater organic constituents have been treated by combustion units as specified in 268.42, Table 1. I have been unable to detect the nonwastewater organic constituents, despite having used best good-faith efforts to analyze for such constituents. I am aware there are significant penalties for submitting a false certifications, including the possibility of fine and imprisonment.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: O H 3 8 0 0 0 1 5 3 7 9
2. Page 1 of: 1
3. Emergency Response Phone: 1-800-424-9300
4. Manifest Tracking Number: 000310535 FLE

GENERATOR

5. Generator's Name and Mailing Address
Nasa-Plumbrook Station
6100 Columbus Ave.
Sandusky, OH 44870
Generator's Phone: 216-642-0891

Generator's Site Address (if different than mailing address)
6100 Columbus Ave.
Sandusky, OH 44870

6. Transporter 1 Company Name: EQ Industrial Services
U.S. EPA ID Number: M I 0 0 0 0 2 6 3 8 7 1

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
EQ Detroit Inc.
1923 Frederick
Detroit, MI 48211
Facility's Phone: 313-347-1300
U.S. EPA ID Number: M I D 9 8 0 9 9 1 5 6 6

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. UN, Non-DOT Hazardous, Non-RCRA Regulated Liquids	7	D M	300	G	029L
	2. UN, Non-DOT Hazardous, Non-RCRA Regulated Solids	1	D M	200	P	
	3.					
	4.					

14. Special Handling Instructions and Additional Information
NASA # N09103
9a1) D098220DET/Non-Hazardous IDW Water 9a2) D098221DET/Non-Hazardous Soil
24hr Emergency Response: 1-800-424-9300 provided by Shaw E&I via contract with Chemtrec

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr. Signature: Robert F. Lallier on behalf of Director GRC Month 12 Day 17 Year 09

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: DAVE BLAIR Signature: Dave Blair Month 12 Day 17 Year 09
Transporter 2 Printed/Typed Name: Signature: Month Day Year

DESIGNATED FACILITY

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name Signature Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

APPENDIX G

DATA VALIDATION SUMMARIES

APRIL 2010
ASH PITS 1 & 3 SAMPLING
DATA QUALITY EVALUATION

Data Validation Summary Report
Ash Pits 1 & 3 Sampling December 2008 – November 2009
Former Plum Brook Ordnance Works
Sandusky, Ohio

1.0 Introduction

Level IV data validation was performed on 100 percent of the environmental samples collected for the December 2008 through November 2009 sampling events. The analytical data consisted of eighteen sample delivery groups (0812032, 0812033, 0812042, 0812046, F65191, F65208, F65209, F65373, F65374, F65380, F65381, F65472, F65474, F65523, F67482, F67519, F69338 and F69416), which were analyzed by AML Scientific of Olathe, Kansas and Accutest of Orlando, Florida. In addition, validation of the field-split data, three SDGs (A8L130179, A9H220159 and A8L170228), which were analyzed by Test America, was performed and findings are discussed in section 5.0 of this report. Water and soil matrices were validated.

The following samples were validated for this investigation:

SDG Number	Sample Number
0812032	AP0001, AP0002, AP0003, AP0004, AP0005, AP0006, AP0017, AP0018, AP0019, AP0026, AP0027, AP0028, AP0058
0812033	AP0007, AP0008, AP0009, AP010, AP0011, AP0012, AP0013, AP0014, AP0015, AP0016, AP0023, AP0024, AP0025, AP0063
0812042	AP3000, AP3001
0812046	AP3003, AP3004, WW3005
F65191	AP3050
F65208	AP3052
F65209	AP3051, AP3053, AP3054
F65373	AP2008, AP2012
F65374	AP1008, AP1012
F65380	AP1007, AP1013
F65381	AP2007, AP2013
F65472	AP2009, AP2010, **AP2011***
F65474	AP1009, AP1010, AP1011
F65523	AP2011A
F67482	AP0032, AP0033, AP0036, AP0037, AP0039, AP0040
F67519	AP0042, AP0043, AP0045, AP0046, AP0048, AP0049, AP0051, AP0052, AP0054, AP0055, AP0056, AP0059, AP0061A
F69338	AP3070, AP3071, AP3072, AP3073
F69416	AP3074

*Sample AP2011 collected on 05/23/09 was received broken.

The chemical parameters, for which the samples were analyzed, are identified below:

Parameter (Prep/Analytical Method)
Volatile Organics by GC/MS SW846 5030/8260B
Semivolatile Organics by GC/MS SW846 3510C/8270C
Total and Dissolved Metals by SW846 3005A/6010B and 7470A/7471
Nitroaromatic and Nitramine Explosives by SW846 8330M
PCBs by SW846 8082
Wet Chemistry (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide)

GC/MS – Gas chromatography/mass spectrometry.
TDS - Total dissolved solids.
TOC - Total organic carbon.
TSS – Total suspended solids.

2.0 Procedures

The sample data were validated following the logic identified in the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (October 2004) and the EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Review (June 2008) for all areas except blanks. EPA Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (April 1993) and Region III Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration (September 1994) were applied to the areas associated with blank contamination. Specific quality control (QC) criteria as identified in the quality assurance plan (QAP), analytical methods, and laboratory standard operating procedures (SOP) were applied to all sample results. As a result of the use of Update III SW846 test methods for the analytical data and the application of the Contract Laboratory Program (CLP) guidelines during the validation process, there were instances where the specific QC requirements for all target compounds were not defined. This primarily occurred in the organic, GC/MS calibration areas and is due to the fact that the analytical methods are performance-based and allow the use of average calibration responses in lieu of individual responses, which are defined by CLP protocol. In light of applying CLP guidelines to SW846 methods and evaluating the usability of the data during the validation process, specific QC criteria were determined to address all target compounds and are identified in this report for each parameter, as well as in the validation checklists, which function as worksheets. For those analytical methods not addressed by the CLP and Region III guidelines, the validation was based on the method requirements (i.e., SW846, Code of Federal Regulations, SOPs) and technical judgment, following the logic of the CLP validation guidelines. Lab-specific criteria may be found in Attachment A.

3.0 Summary of Data Validation Findings

The overall quality of the data was determined to be acceptable with minimal qualifications. The only rejected data ("R" qualified) was due to "poor performing" volatile compounds (ketones, some halogenated hydrocarbons, etc.), which experienced poor calibration responses in the associated calibration data and samples that were reanalyzed and have more than one set of results reported. The "R" qualifier was assigned to the samples with more than one set of results to indicate that a given result should not be used to characterize a particular constituent or an

analysis for a given sample. Tetryl results for sample AP0028 (SDG 0812032) required an "R" qualifier due to recovery for MS/MSD performance.

Individual validation reports have been prepared for each parameter, and the overall results of the validation findings are summarized in this report. A listing of the validation qualifiers and the reason codes, along with their definitions, is found in Attachment A. The following section highlights the key findings of the data validation for each analysis.

4.0 Analysis-Specific Data Validation Summaries

4.1 Volatile Organics by GC/MS SW846 8260B

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Initial and Continuing Calibration

The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL/CCAL relative response factor (RRF) <0.1:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65208	AP3052	Acetone	R
F65209	AP3051, AP3053, AP3054	Acetone	J/R
F69338	AP3070	Acetone	R
F69416	AP3074	Acetone	B

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65209	AP3051, AP3053, AP3054	Chloroethane	UJ
	AP3053, AP3054	Bromoform, Styrene, Methylene Chloride	UJ/B

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable with the following exception(s):

SDG Number	Samples Affected	Compounds	Blank Contaminant	Validation Qualifier
F65209	AP3053, AP3054	Methylene Chloride	Method	B
F69416	AP3074	Acetone	Equipment	B

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65209	AP3053	Acetone, trans-1,3-Dichloropropene	J/UJ

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65209	AP3053, AP3054	Styrene	UJ

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.2 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0003, AP0006, AP0018, AP0019, AP0028, AP0058	Benzoic Acid, 2,4-Dinitrophenol, n-Nitrosodimethylaminie	UJ
	AP0001	Fluoranthene, Pyrene	QJ
	AP0026	Dibenzofuran, 2-Methylnaphthalene	
0812033	AP0007, AP0008, AP0013, AP0014, AP0016, AP0025	Benzoic Acid, 2,4-Dinitrophenol, n-Nitrosodimehtylamine	UJ
	AP0009	4-Chloroaniline, 3,3'-Dichlorobenzidine, Hexachlorocyclopentadiene	UJ
0812042	AP3000, AP3001	2,4-Dinitrophenol	UJ
0812046	AP3003, AP3004, WW3005	Benzoic Acid, 4-Chloroaniline	UJ
F65474	AP1009	2,4-Dinitrophenol	UJ
F67482	AP0040	Hexachlorocyclopendadiene	UJ

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812033	AP0024	4-Chloroaniline, 3,3'-Dichlorobenzidine, 3-Nitroaniline, 4-Nitroaniline	UJ
F67482	AP0040	3,3'-Dichlorobenzidine*, 2,4-Dinitrophenol, Hexachlorocyclopentadiene	UJ

*Compound qualified for %RPD outside QC limits for the MS/MSD analysis.

Laboratory Control Sample

Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812033	AP0007, AP0008, AP0009, AP0010, AP0011, AP0012, AP0013, AP0014, AP0015, AP0016, AP0023, AP0024, AP0025, AP0063	4-Chloroaniline*, 3,3'-Dichlorobenzidine*, 3-Nitroaniline*	UJ

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812033	AP0010, AP0011, AP0012, AP0015, AP0023, AP0024, AP0063	Benzyl Alcohol, 4-Nitroaniline	UJ

*Compound qualified for %RPD outside QC limits for the LCS/LCSD analysis.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

In addition, during the validation process, the Shaw Validation group identified a problem with SVOC constituents calculated by linear regression. The linearity passed calibration criteria but the curve is shifted to the right which leads to a large negative Y intercept. Several SVOC results are biased high due to this issue. The laboratory should have reported results calculated from instrument responses less than 20% below that of the low standard as non-detect per the method. However, this was not done. AML was in the process of bankruptcy and non-responsive to this issue at the time it was noted. This issue was brought to the attention of the Nashville USACE and the decision was made to manually recalculate any SVOCs results calculated by linear regression that were above an action level.

4.3 Total and Dissolved Metals by SW846 6010B/7470A/7471

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable, with the following exception(s):

SDG Number	Samples Affected	Analytes	Blank Contaminant	Validation Qualifier
F65474	AP1009	Se (Total)	Equipment	B
F69338	AP3070, AP3071, AP3072	Pb (Total)	Method	B
	AP3070, AP3072, AP3073	Zn (Total)		

Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
0812032	AP0001, AP0002, AP0003, AP0004, AP0005, AP0006, AP0017, AP0018, AP0019, AP0026, AP0027, AP0028, AP0058	(Total) Sb, As, Ba, Se	J/UJ
0812033	AP0024	(Total) Al, Sb*, As*, Ca, Se, Ag, Tl	J/UJ
F65474	AP1009	(Total) Sb, Mn	J
F67482	AP0032, AP0033, AP0036, AP0037, AP0039, AP0040	(Total) Al, Sb, Ca, Mn, Ag, Zn	J/UJ
F69416	AP3074	Se (Total and Filtered)	J

*Analytes were qualified for %RPD outside QC limits for the MS/MSD analysis.

Laboratory Duplicate Sample Analysis

A Laboratory Duplicate Sample analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F65208	AP3052	(Total) Al	J
F65474	AP1009	(Total) Cd	J
F69338	AP3071, AP3072	(Total) Se	B/J
	AP3070, AP3071, AP3072	(Total) Lead	

Laboratory Control Sample

Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Interference Check Sample

All Interference Check Sample (ICS) percent recoveries were met.

Inductively Coupled Plasma Serial Dilutions

All QC criteria were met for the serial dilutions associated with the project samples with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0001, AP0002, AP0003, AP0004, AP0005, AP0006, AP0017, AP0018, AP0019, AP0027, AP0026, AP0028, AP0058	(Total) Al, Be, Cu	J

SDG	Samples Affected	Compound(s)	Validation Qualifier
	AP0001, AP0002, AP0003, AP0004, AP0005, AP0017, AP0018, AP0019, AP0026, AP0027, AP0028, AP0058	(Total) K, V	J
	AP0001, AP0002, AP0003, AP0005, AP0006, AP0018, AP0019, AP0027, AP0028, AP0058,	(Total) Ni	J
0812033	AP0007, AP0008, AP0009, AP0010, AP0011, AP0012, AP0013, AP0014, AP0015, AP0016, AP0023, AP0024, AP0025, AP0063	(Total) Be, V	J
F65208	AP3052	(Total) Al	J
F65474	AP1009	(Total) Mn, Ca, Co, Fe, Mg, Ni, Zn	J
F67482	AP0032, AP0033, AP0036, AP0037, AP0039, AP0040	(Total) Ca, Mn, Cr, Co, Fe, Mg, K	J
F69416	AP3074	(Total) Fe, K (Filtered) K	J

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "B", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.4 Nitroaromatic and Nitroamine Explosives by SW846 8330

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples, with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
0812032	AP0004, AP0026	Explosives	UJ

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0004, AP0026	2-Nitrotoluene	UJ

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits, with the following exceptions:

SDG Number	Samples Affected	Validation Qualifier
0812032	AP0001, AP0003, AP0004, AP0005, AP0006, AP0017, AP0019, AP0026, AP0027, AP0058	UJ
0812033	AP0007, AP0009, AP0010, AP0014, AP0023, AP0024, AP0063	UJ
F65209	AP3054	UJ
F65381	AP2013	UJ
F65472	AP2009	UJ
F69338	AP3073	UJ
F69416	AP3074	UJ

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0028	4-Amino-2,6-dinitrotoluene, 2-Amino-4,6-dinitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, 2,6- Dinitrotoluene, Nitrobenzene, 2-Nitrotoluene, 3-Nitrotoluene, 4-Nitrotoluene, Tetryl, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ/R

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

4.5 Polychlorinated Biphenyls (PCBs) by SW846 8082

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits, with the following exceptions.

SDG Number	Samples Affected	Compound	Validation Qualifier
0812033	AP0023	Aroclor-1260	J

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40% RPD) were met.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

For SDG F65380, analyte concentrations for Aroclor 1254 and Aroclor 1260 for both samples (AP1007 and AP1013) that were flagged as "J" by the lab to indicate an estimated value due to the presence of multiple overlapping Aroclor patterns were qualified as estimated (J – 15, 19).

4.6 Wet Chemistry (TOC, Sulfate, Nitrate, Chloride, Alkalinity, Turbidity, TDS, TSS, Hardness, Cyanide

Overall, the data are of good quality and are usable as reported by the laboratory with the

exceptions noted below. Data were reviewed for the following:

Preservation
Preservation criteria were met for all samples.

Holding Times
Technical holding time criteria were met for all samples with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
0812032	AP0001	TOC	J
F65191	AP3050	Total Cyanide	UJ
F65208	AP3052	Total Cyanide	UJ
F65209	AP3051, AP3053, AP3054	Turbidity, Total Cyanide	J/UJ
F69416	AP3074	Turbidity	J

Initial and Continuing Calibration
All initial and continuing calibrations associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found acceptable with the following exception(s):

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analytes(s)	Validation Qualifier
F69338	AP3070, AP3071, AP3073	Nitrate-Nitrite, Sulfate	J/UJ
F69416	AP3074	Chloride, Nitrate-Nitrite	J

Laboratory Duplicate Sample Analysis
A Laboratory Duplicate Sample analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated and no problems were identified.

Quantitation
Results quantified between the MDL and RL which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.0 Quality Assurance Field Split Sample Data Evaluation

Data from the quality assurance split samples, (SDGs: A8L130179, A8L170228 and A9H220159), were validated. The field split (FS) samples were analyzed for Semivolatiles by SW846 8270C, Explosives by SW846 8330, Polychlorinated Biphenyls (PCBs) by SW846 8280, and Total and Dissolved Metals by SW 846 6010B. The following section highlights the key findings of the data validation for each analysis.

The following samples were validated for this site investigation:

SDG Number	Sample Number
A8L130179	AP0061, AP0062, AP0057
A8L170228	WW3013
A9H220159	AP0060, AP0057A

5.1 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times

Technical holding time criteria were met for all samples.

Initial and Continuing Calibration

The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria with the following exception(s):

The following exhibited individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20%:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
A8L170228	WW3013	Hexachlorocyclopentadiene	UJ

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation

			Qualifier
A9H220159	AP0060	Pentachlorophenol	UJ

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Internal Standards
All internal standards met QC criteria.

Field Splits
A Relative Percent Difference is calculated for the analytes that were positive detects; the Regular/Field Duplicate/Field Split comparison of the data is listed in Table 2. The Original/Field Duplicate/Field Split samples that were analyzed for Semivolatiles are listed in the table below:

Sample/FD/FS
AP0028 (Original) / AP0058 (FD) / AP0061 (FS)
AP0011 (Original) / AP0012 (FD) / AP0062 (FS)
AP0023 (Original) / AP0063 (FD) / AP0057 (FS)
AP3003 (Original) / WW3005 (FD / WW3013 (FS)
AP0052 (Original) / AP0059 (FD) / AP0060 (FS)
AP0054 (Original) / AP0056 (FD) / AP0057A (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.2 Total and Dissolved Metals by SW846 6010B/7470A/7471

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate

Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Interference Check Sample
All Interference Check Sample (ICS) percent recoveries were acceptable. All QC criteria were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples.

Field Splits
Table 2 shows the Regular/Field Duplicate/Field Split comparison of the data. A Relative Percent Difference is calculated for the analytes that were positive detects. The samples (Original/FD/FS) that had a metal analysis performed are listed below:

Sample/FD/FS
AP0028 (Original) / AP0058 (FD) / AP0061 (FS)
AP0011 (Original) / AP0012 (FD) / AP0062 (FS)
AP0023 (Original) / AP0063 (FD) / AP0057 (FS)
AP0052 (Original) / AP0059 (FD) / AP0060 (FS)
AP0054 (Original) / AP0056 (FD) / AP0057A (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "B", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.3 Nitroaromatic and Nitroamine Explosives by SW846 8330

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Field Splits
Original and field split results were evaluated and no problems were identified. All analytes were non-detect in the original and field split samples. Explosives by SW846 8330 analysis was performed on the original, field duplicate and field split samples listed below.

Sample/FD/FS
AP0028 (Original) / AP0058 (FD) / AP0061 (FS)
AP0011 (Original) / AP0012 (FD) / AP0062 (FS)
AP0023 (Original) / AP0063 (FD) / AP0057 (FS)
AP3003 (Original) / WW3005 (FD / WW3013 (FS)
AP0052 (Original) / AP0059 (FD) / AP0060 (FS)
AP0054 (Original) / AP0056 (FD) / AP0057A (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

5.4 Polychlorinated Biphenyls (PCBs) by SW846 8082

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following;

Holding Times
Technical holding time criteria were met for all samples.

Initial and Continuing Calibration
The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
Laboratory Control Sample (LCS) analysis was performed for the project samples and all QC criteria were met.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40% RPD) were met.

Field Splits
Original and field split results were evaluated and no problems were identified. All analytes were non-detect in the original and field split samples. A PCB analysis was performed on the original and field split samples listed below.

Sample/FD/FS
AP0011 (Original) / AP0012 (FD) / AP0062 (FS)
AP0023 (Original) / AP0063 (FD) / AP0057 (FS)
AP0052 (Original) / AP0059 (FD) / AP0060 (FS)
AP0054 (Original) / AP0056 (FD) / AP0057A (FS)

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the lab qualified as "J", were qualified as estimated "J" unless blank contamination was present or the results were rejected.

Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B (metals)	The analyte was detected; the concentration is below the reporting limit.
B (organics)	Indicates analyte is found in associated method blank.
J (metals)	The compound was detected in the blank.
J (organics)	The compound was positively identified; the reported value is below the reporting limit.
U	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
E	Indicates that the result is above the maximum calibration range.
N	Indicates presumptive evidence of a compound.
P	RPD > 40% between the primary and confirmation column results for dual column chromatographic method (e.g. GC and HPLC methods).
*	Exceeds QC limit.
Q1	The %D or %Drift for the associated CCV is outside the method QC limit.
ME	Marginal Exceedence of the 3-sigma QC limits.
ME*	Exceedence of the 4-sigma QC limits.
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260E									
Acetone	61 - 144	61 - 144	29	20 - 160	20 - 160	30	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	64 - 130	64 - 130	30	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	72 - 129	72 - 129	30	N/A	N/A	N/A
Benzene	78 - 130	78 - 130	25	75 - 125	75 - 125	30	75 - 129	75 - 129	N/A
Bromobenzene	N/A	N/A	N/A	65 - 120	65 - 120	30	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Bromodichloromethane	73 - 122	73 - 122	25	70 - 130	70 - 130	30	N/A	N/A	N/A
Bromoform	70 - 139	70 - 139	26	55 - 135	55 - 135	30	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	30 - 160	30 - 160	30	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	30 - 160	30 - 160	30	N/A	N/A	N/A
Chlorobenzene	83 - 122	83 - 122	23	75 - 125	75 - 125	30	75 - 127	75 - 127	N/A
Chloroethane	61 - 153	61 - 153	31	40 - 155	40 - 155	30	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	50 - 130	50 - 130	30	N/A	N/A	N/A
Chloroform	79 - 129	79 - 129	27	70 - 125	70 - 125	30	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Carbon disulfide	61 - 142	61 - 142	27	45 - 160	45 - 160	30	N/A	N/A	N/A
Carbon tetrachloride	79 - 135	79 - 135	29	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	40 - 135	40 - 135	30	N/A	N/A	N/A
1,1-Dichloroethane	77 - 132	77 - 132	26	75 - 125	75 - 125	30	N/A	N/A	N/A
1,1-Dichloroethylene	66 - 132	66 - 132	27	65 - 135	65 - 135	30	55 - 142	55 - 142	N/A
1,2-Dichloroethane	78 - 129	78 - 129	24	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2-Dichloropropane	74 - 127	74 - 127	27	70 - 120	70 - 120	30	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,1-Dichloropropene	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	75 - 120	75 - 120	30	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Dibromochloromethane	78 - 117	78 - 117	27	65 - 130	65 - 130	30	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	35 - 135	35 - 135	30	N/A	N/A	N/A
cis-1,2-Dichloroethylene	74 - 123	74 - 123	26	65 - 125	65 - 125	30	N/A	N/A	N/A
cis-1,3-Dichloropropene	79 - 130	79 - 130	23	70 - 125	70 - 125	30	N/A	N/A	N/A
trans-1,2-Dichloroethylene	77 - 129	77 - 129	27	65 - 135	65 - 135	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
trans-1,3-Dichloropropene	87 - 131	87 - 131	27	65 - 125	65 - 125	30	N/A	N/A	N/A
Ethylbenzene	82 - 124	82 - 124	25	75 - 125	75 - 125	30	N/A	N/A	N/A
2-Hexanone	67 - 130	67 - 130	29	45 - 145	45 - 145	30	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	75 - 135	75 - 135	30	N/A	N/A	N/A
4-Methyl-2-pentanone	69 - 125	69 - 125	24	45 - 145	45 - 145	30	N/A	N/A	N/A
Methyl bromide	60 - 146	60 - 146	31	N/A	N/A	N/A	N/A	N/A	N/A
Methyl chloride	58 - 163	58 - 163	26	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	62 - 140	62 - 140	25	55 - 140	55 - 140	30	N/A	N/A	N/A
Methyl ethyl ketone	66 - 134	66 - 134	23	N/A	N/A	N/A	N/A	N/A	N/A
Methyl tert-Butyl ether	N/A	N/A	N/A	81 - 126	81 - 126	30	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	40 - 125	40 - 125	30	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	65 - 140	65 - 140	30	N/A	N/A	N/A
n-Propylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
Styrene	79 - 123	79 - 123	28	75 - 125	75 - 125	30	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,1-Trichloroethane	80 - 133	80 - 133	27	70 - 135	70 - 135	30	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,1,2-Tetrachloroethane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	70 - 128	70 - 128	30	55 - 130	55 - 130	30	N/A	N/A	N/A
1,1,2-Trichloroethane	76 - 118	76 - 118	28	60 - 125	60 - 125	30	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	60 - 135	60 - 135	30	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
Tetrachloroethylene	79 - 132	79 - 132	27	65 - 140	65 - 140	30	N/A	N/A	N/A
Toluene	80 - 123	80 - 123	26	70 - 125	70 - 125	30	71 - 130	71 - 130	N/A
Trichloroethylene	78 - 132	78 - 132	28	75 - 125	75 - 125	30	70 - 131	70 - 131	N/A
Trichlorofluoromethane	N/A	N/A	N/A	25 - 185	25 - 185	30	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	71 - 126	71 - 126	30	N/A	N/A	N/A
Vinyl chloride	60 - 145	60 - 145	29	60 - 125	60 - 125	30	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	80 - 125	80 - 125	30	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Xylene (total)	83 - 127	83 - 127	24	N/A	N/A	N/A	N/A	N/A	N/A
Semivolatile Organic Compounds, SW-846 8270(									

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Benzoic Acid	44 - 116	44 - 116	36	0 - 110	0 - 110	25	N/A	N/A	N/A
2-Chlorophenol	54 - 97	54 - 97	31	45 - 105	45 - 105	25	32 - 110	32 - 110	30
4-Chloro-3-methyl phenol	59 - 102	59 - 102	27	45 - 115	45 - 115	25	32 - 117	32 - 117	30
2,4-Dichlorophenol	60 - 101	60 - 101	30	45 - 110	45 - 110	25	N/A	N/A	N/A
2,4-Dimethylphenol	49 - 89	49 - 89	31	30 - 105	30 - 105	25	N/A	N/A	N/A
2,4-Dinitrophenol	39 - 107	39 - 107	40	15 - 130	15 - 130	25	N/A	N/A	N/A
4,6-Dinitro-o-cresol	58 - 109	58 - 109	37	30 - 135	30 - 135	25	N/A	N/A	N/A
2-Methylphenol	53 - 94	53 - 94	29	40 - 105	40 - 105	25	N/A	N/A	N/A
3&4-Methylphenol	54 - 95	54 - 95	31	N/A	N/A	25	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	40 - 105	40 - 105	25	N/A	N/A	N/A
2-Nitrophenol	55 - 96	55 - 96	30	40 - 110	40 - 110	25	N/A	N/A	N/A
4-Nitrophenol	56 - 106	56 - 106	29	15 - 140	15 - 140	25	10 - 125	10 - 125	30
Pentachlorophenol	50 - 115	50 - 115	33	25 - 120	25 - 120	25	10 - 182	10 - 182	30
Phenol	55 - 99	55 - 99	28	40 - 100	40 - 100	25	10 - 144	10 - 144	30
2,4,5-Trichlorophenol	60 - 101	60 - 101	28	50 - 110	50 - 110	25	N/A	N/A	N/A
2,4,6-Trichlorophenol	60 - 100	60 - 100	27	45 - 110	45 - 110	25	N/A	N/A	N/A
Acenaphthene	59 - 97	59 - 97	29	45 - 110	45 - 110	25	10 - 200	10 - 200	30
Acenaphthylene	58 - 98	58 - 98	30	45 - 105	45 - 105	25	N/A	N/A	N/A
Anthracene	61 - 104	61 - 104	29	55 - 105	55 - 105	25	N/A	N/A	N/A
Benzo(a)anthracene	60 - 106	60 - 106	31	50 - 110	50 - 110	25	N/A	N/A	N/A
Benzo(a)pyrene	59 - 102	59 - 102	32	50 - 110	50 - 110	25	N/A	N/A	N/A
Benzo(b)fluoranthene	60 - 107	60 - 107	31	45 - 115	45 - 115	25	N/A	N/A	N/A
Benzo(g,h,i)perylene	56 - 103	56 - 103	32	40 - 125	40 - 125	25	N/A	N/A	N/A
Benzo(k)fluoranthene	61 - 107	61 - 107	30	45 - 125	45 - 125	25	N/A	N/A	N/A
4-Bromophenol phenyl ether	60 - 104	60 - 104	26	45 - 115	45 - 115	25	N/A	N/A	N/A
Butyl benzyl phthalate	57 - 110	57 - 110	28	50 - 125	50 - 125	25	N/A	N/A	N/A
Benzyl Alcohol	N/A	N/A	N/A	20 - 125	20 - 125	25	N/A	N/A	N/A
Butyl Alcohol	51 - 102	51 - 102	34	N/A	N/A	N/A	N/A	N/A	N/A
2-Chloronaphthalene	57 - 95	57 - 95	28	45 - 105	45 - 105	25	N/A	N/A	N/A
4-Chloroaniline	19 - 85	19 - 85	34	10 - 95	10 - 95	25	N/A	N/A	N/A
Carbazole	60 - 106	60 - 106	30	45 - 115	45 - 115	25	N/A	N/A	N/A
Chrysene	60 - 107	60 - 107	31	55 - 110	55 - 110	25	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	51 - 89	51 - 89	30	45 - 110	45 - 110	25	N/A	N/A	N/A
bis(2-Chloroethyl)ether	50 - 96	50 - 96	33	40 - 105	40 - 105	25	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	44 - 94	44 - 94	32	20 - 115	20 - 115	25	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	60 - 101	60 - 101	26	45 - 110	45 - 110	25	N/A	N/A	N/A
1,2-Dichlorobenzene	47 - 91	47 - 91	35	45 - 95	45 - 95	25	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,3-Dichlorobenzene	45 - 86	45 - 86	36	40 - 100	40 - 100	25	N/A	N/A	N/A
1,4-Dichlorobenzene	45 - 88	45 - 88	36	35 - 105	35 - 105	25	26 - 110	26 - 110	30
2,4-Dinitrotoluene	59 - 103	59 - 103	30	50 - 115	50 - 115	25	42 - 118	42 - 118	30
2,6-Dinitrotoluene	57 - 99	57 - 99	30	50 - 110	50 - 110	25	N/A	N/A	N/A
3,3'-Dichlorobenzidine	34 - 88	34 - 88	31	10 - 130	10 - 130	25	N/A	N/A	N/A
Dibenzo(a,h)antracene	57 - 105	57 - 105	29	40 - 125	40 - 125	25	N/A	N/A	N/A
Dibenzofuran	58 - 103	58 - 103	27	50 - 105	50 - 105	25	N/A	N/A	N/A
Di-n-butyl phthalate	59 - 105	59 - 105	27	55 - 110	55 - 110	25	N/A	N/A	N/A
Di-n-octyl phthalate	59 - 117	59 - 117	28	40 - 130	40 - 130	25	N/A	N/A	N/A
Diethyl phthalate	59 - 106	59 - 106	27	50 - 115	50 - 115	25	N/A	N/A	N/A
Dimethyl phthalate	60 - 100	60 - 100	26	50 - 110	50 - 110	25	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	57 - 111	57 - 111	29	45 - 125	45 - 125	25	N/A	N/A	N/A
Fluoranthene	60 - 110	60 - 110	32	55 - 115	55 - 115	25	N/A	N/A	N/A
Fluorene	60 - 99	60 - 99	30	50 - 110	50 - 110	25	N/A	N/A	N/A
Hexachlorobenzene	58 - 103	58 - 103	27	45 - 120	45 - 120	25	N/A	N/A	N/A
Hexachlorobutadiene	49 - 95	49 - 95	33	40 - 115	40 - 115	25	N/A	N/A	N/A
Hexachlorocyclopentadiene	36 - 94	36 - 94	41	45 - 135	45 - 135	25	N/A	N/A	N/A
Hexachloroethane	44 - 89	44 - 89	38	35 - 110	35 - 110	25	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	57 - 104	57 - 104	33	40 - 120	40 - 120	25	N/A	N/A	N/A
Isophorone	58 - 97	58 - 97	30	45 - 110	45 - 110	25	N/A	N/A	N/A
2-Methylnaphthalene	57 - 103	57 - 103	32	45 - 105	45 - 105	25	N/A	N/A	N/A
2-Nitroaniline	53 - 106	53 - 106	29	45 - 120	45 - 120	25	N/A	N/A	N/A
3-Nitroaniline	29 - 85	29 - 85	31	25 - 110	25 - 110	25	N/A	N/A	N/A
4-Nitroaniline	49 - 104	49 - 104	31	35 - 115	35 - 115	25	N/A	N/A	N/A
Naphthalene	54 - 93	54 - 93	32	40 - 105	40 - 105	25	N/A	N/A	N/A
Nitrobenzene	53 - 92	53 - 92	32	40 - 115	40 - 115	25	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	49 - 94	49 - 94	28	40 - 115	40 - 115	25	30 - 121	30 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	20 - 115	20 - 115	25	N/A	N/A	N/A
N-Nitrosodiphenylamine	53 - 107	53 - 107	28	50 - 115	50 - 115	25	N/A	N/A	N/A
Phenanthrene	61 - 103	61 - 103	32	50 - 110	50 - 110	25	N/A	N/A	N/A
Pyrene	58 - 109	58 - 109	33	45 - 125	45 - 125	25	10 - 200	10 - 200	30
Diphenylamine	N/A	N/A	N/A	45 - 135	45 - 135	25	N/A	N/A	N/A
1,2,4-Trichlorobenzene	52 - 93	52 - 93	32	45 - 110	45 - 110	25	33 - 110	33 - 110	30
Nitroaromatics and Nitroamines, SW-846 8330									
HMX	75 - 156	75 - 156	27	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
RDX	77 - 131	77 - 131	28	70 - 135	70 - 135	50	70 - 135	70 - 135	N/A
1,3-Dinitrobenzene	82 - 134	82 - 134	20	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
2,6-Dinitrotoluene	86 - 142	86 - 142	17	80 - 120	80 - 120	50	80 - 120	80 - 120	N/A
2,4-Dinitrotoluene	74 - 129	74 - 129	18	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
2-amino-4,6-Dinitrotoluene	83 - 123	83 - 123	22	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
4-amino-2,6-Dinitrotoluene	85 - 137	85 - 137	18	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
Nitrobenzene	82 - 138	82 - 138	19	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
o-Nitrotoluene	85 - 129	85 - 129	21	75 - 120	75 - 120	50	75 - 120	75 - 120	N/A
m-Nitrotoluene	85 - 136	85 - 136	22	80 - 125	80 - 125	50	80 - 125	80 - 125	N/A
p-Nitrotoluene	86 - 133	86 - 133	19	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
Tetryl	53 - 124	53 - 124	22	10 - 150	10 - 150	50	10 - 150	10 - 150	N/A
1,3,5-Trinitrobenzene	81 - 138	81 - 138	24	75 - 125	75 - 125	50	75 - 125	75 - 125	N/A
2,4,6-Trinitrotoluene	70 - 137	70 - 137	29	55 - 140	55 - 140	50	55 - 140	55 - 140	N/A
PCBs, SW-846 8082									
Aroclor-1016	69 - 117	69 - 117	26	40 - 140	40 - 140	20	10 - 199	10 - 199	30
Aroclor-1260	71 - 121	71 - 121	30	60 - 130	60 - 130	20	10 - 199	10 - 199	30
Metals, SW-846 6010B/7470A									
Aluminum	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML Scientific, LLC			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Mercury	80 - 120	80 - 120	20	75 - 125	75 - 125	35	80 - 120	75 - 125	20
Total Organic Carbon (TOC) SW-846 9060									
TOC			25	70 - 130					

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B									
Acetone	59 - 134	59 - 134	14	40 - 140	40 - 140	30	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	54 - 142	54 - 142	30	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	40 - 140	40 - 140	30	N/A	N/A	N/A
Benzene	83 - 124	83 - 124	11	80 - 120	80 - 120	30	78 - 118	78 - 118	N/A
Bromobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	65 - 130	65 - 130	30	N/A	N/A	N/A
Bromodichloromethane	76 - 116	76 - 116	10	75 - 120	75 - 120	30	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	30 - 145	30 - 145	30	N/A	N/A	N/A
Bromoform	68 - 128	68 - 128	11	70 - 130	70 - 130	30	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	30 - 150	30 - 150	30	N/A	N/A	N/A
Chlorobenzene	87 - 115	87 - 115	9	80 - 120	80 - 120	30	76 - 117	76 - 117	N/A
Chloroethane	54 - 166	54 - 166	20	60 - 135	60 - 135	30	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	40 - 125	40 - 125	30	N/A	N/A	N/A
Chloroform	85 - 123	85 - 123	10	65 - 135	65 - 135	30	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Carbon disulfide	67 - 147	67 - 147	12	35 - 160	35 - 160	30	N/A	N/A	N/A
Carbon tetrachloride	74 - 139	74 - 139	13	65 - 140	65 - 140	30	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	80 - 120	80 - 120	30	N/A	N/A	N/A
1,1-Dichloroethane	82 - 127	82 - 127	10	70 - 135	70 - 135	30	N/A	N/A	N/A
1,1-Dichloroethylene	75 - 133	75 - 133	13	70 - 130	70 - 130	30	62 - 130	62 - 130	N/A
1,1-Dichloropropene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
1,2-Dichloroethane	76 - 122	76 - 122	11	70 - 130	70 - 130	30	N/A	N/A	N/A
1,2-Dichloropropane	81 - 120	81 - 120	11	75 - 125	75 - 125	30	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	70 - 120	70 - 120	30	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
Dibromochloromethane	74 - 116	74 - 116	11	60 - 135	60 - 135	30	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	30 - 155	30 - 155	30	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	50 - 130	50 - 130	30	N/A	N/A	N/A
cis-1,2-Dichloroethylene	81 - 114	81 - 114	10	70 - 125	70 - 125	30	N/A	N/A	N/A
cis-1,3-Dichloropropene	83 - 119	83 - 119	10	70 - 130	70 - 130	30	N/A	N/A	N/A
trans-1,2-Dichloroethylene	82 - 126	82 - 126	10	60 - 140	60 - 140	30	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 123	87 - 123	10	55 - 140	55 - 140	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Ethylbenzene	87 - 118	87 - 118	10	75 - 125	75 - 125	30	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	50 - 140	50 - 140	30	N/A	N/A	N/A
2-Hexanone	58 - 125	58 - 125	14	55 - 130	55 - 130	30	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
4-Methyl-2-pentanone	62 - 125	62 - 125	13	60 - 135	60 - 135	30	N/A	N/A	N/A
Methyl bromide	55 - 151	55 - 151	21	N/A	N/A	N/A	N/A	N/A	N/A
Methyl chloride	55 - 173	55 - 173	22	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	69 - 125	69 - 125	11	55 - 140	55 - 140	30	N/A	N/A	N/A
Methyl ethyl ketone	61 - 127	61 - 127	13	N/A	N/A	N/A	N/A	N/A	N/A
Methyl tert-Butyl Ether	N/A	N/A	N/A	65 - 125	65 - 125	30	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	70 - 135	70 - 135	30	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
n- Propylbenzene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	70 - 125	70 - 125	30	N/A	N/A	N/A
Styrene	78 - 118	78 - 118	11	65 - 135	65 - 135	30	N/A	N/A	N/A
1,1,1-Trichloroethane	79 - 133	79 - 133	11	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1.1,2-Tetrachloroethane	N/A	N/A	N/A	80 - 130	80 - 130	30	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	71 - 120	71 - 120	11	65 - 130	65 - 130	30	N/A	N/A	N/A
1,1,2-Trichloroethane	80 - 114	80 - 114	11	75 - 125	75 - 125	30	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	55 - 140	55 - 140	30	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	75 - 125	75 - 125	30	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	65 - 135	65 - 135	30	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
Tetrachloroethylene	80 - 131	80 - 131	12	45 - 150	45 - 150	30	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	70 - 130	70 - 130	30	N/A	N/A	N/A
Toluene	86 - 116	86 - 116	10	75 - 120	75 - 120	30	70 - 119	70 - 119	N/A
Trichloroethylene	85 - 124	85 - 124	10	70 - 125	70 - 125	30	62 - 130	62 - 130	N/A
Trichlorofluoromethane	N/A	N/A	N/A	60 - 145	60 - 145	30	N/A	N/A	N/A
Vinyl chloride	57 - 153	57 - 153	22	50 - 145	50 - 145	30	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	72 - 121	72 - 121	30	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	75 - 130	75 - 130	30	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	80 - 120	80 - 120	30	N/A	N/A	N/A
Xylene (total)	86 - 120	86 - 120	10	N/A	N/A	N/A	N/A	N/A	N/A
Semivolatile Organic Compounds, SW-846 8270C									
Benzoic Acid	10 - 50	10 - 50	40	20 - 145	20 - 145	50	N/A	N/A	N/A
2-Chlorophenol	44 - 103	44 - 103	29	35 - 105	35 - 105	50	27 - 110	27 - 110	30

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
4-Chloro-3-methyl phenol	53 - 105	53 - 105	24	45 - 110	45 - 110	50	39 - 110	39 - 110	30
2,4-Dichlorophenol	53 - 108	53 - 108	26	50 - 105	50 - 105	50	N/A	N/A	N/A
2,4-Dimethylphenol	37 - 91	37 - 91	28	30 - 110	30 - 110	50	N/A	N/A	N/A
2,4-Dinitrophenol	37 - 111	37 - 111	30	15 - 140	15 - 140	50	N/A	N/A	N/A
4,6-Dinitro-o-cresol	62 - 115	62 - 115	26	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylphenol	35 - 91	35 - 91	30	40 - 110	40 - 110	50	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
3&4-Methylphenol	32 - 85	32 - 85	29	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	49 - 111	49 - 111	30	40 - 115	40 - 115	50	N/A	N/A	N/A
4-Nitrophenol	13 - 55	13 - 55	31	10 - 85	10 - 85	50	12 - 130	12 - 130	30
Pentachlorophenol	57 118	57 118	26	40 - 115	40 - 115	50	26 - 110	26 - 110	30
Phenol	13 - 54	13 - 54	34	21 - 50	21 - 50	50	14 - 112	14 - 112	30
2,4,5-Trichlorophenol	59 - 106	59 - 106	23	50 - 110	50 - 110	50	N/A	N/A	N/A
2,4,6-Trichlorophenol	58 - 107	58 - 107	24	50 - 115	50 - 115	50	N/A	N/A	N/A
Acenaphthene	58 - 106	58 - 106	21	45 - 110	45 - 110	50	40 - 110	40 - 110	30
Acenaphthylene	58 - 105	58 - 105	21	50 - 105	50 - 105	50	N/A	N/A	N/A
Anthracene	65 - 108	65 - 108	19	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(a)anthracene	63 - 111	63 - 111	19	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(a)pyrene	62 - 106	62 - 106	20	55 - 110	55 - 110	50	N/A	N/A	N/A
Benzo(b)fluoranthene	63 - 109	63 - 109	20	45 - 120	45 - 120	50	N/A	N/A	N/A
Benzo(g,h,i)perylene	61 - 111	61 - 111	21	40 - 125	40 - 125	50	N/A	N/A	N/A
Benzo(k)fluoranthene	64 - 111	64 - 111	20	45 - 125	45 - 125	50	N/A	N/A	N/A
4-Bromophenol phenyl ether	64 - 107	64 - 107	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Butyl benzyl phthalate	59 - 114	59 - 114	20	45 - 115	45 - 115	50	N/A	N/A	N/A
Benzyl Alcohol	34 - 98	34 - 98	27	45 - 135	45 - 135	50	N/A	N/A	N/A
2-Chloronaphthalene	54 - 105	54 - 105	24	50 - 105	50 - 105	50	N/A	N/A	N/A
4-Chloroaniline	53 - 103	53 - 103	22	15 - 110	15 - 110	50	N/A	N/A	N/A
Carbazole	66 - 109	66 - 109	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Chrysene	64 - 111	64 - 111	19	55 - 110	55 - 110	50	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	48 - 101	48 - 101	28	45 - 105	45 - 105	50	N/A	N/A	N/A
bis(2-Chloroethyl)ether	51 - 108	51 - 108	27	35 - 110	35 - 110	50	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	43 - 106	43 - 106	27	25 - 130	25 - 130	50	N/A	N/A	N/A
4-Chlorophenyl pheny ether	61 - 107	61 - 107	20	50 - 110	50 - 110	50	N/A	N/A	N/A
1,2-Dichlorobenzene	41 - 102	41 - 102	28	35 - 100	35 - 100	50	N/A	N/A	N/A
1,3-Dichlorobenzene	38 - 100	38 - 100	28	30 - 100	30 - 100	50	N/A	N/A	N/A
1,4-Dichlorobenzene	40 - 100	40 - 100	28	30 - 100	30 - 100	50	19 - 110	19 - 110	30
2,4-Dinitrotoluene	60 - 109	60 - 109	20	50 - 120	50 - 120	50	52 - 123	52 - 123	30
2,6-Dinitrotoluene	58 - 104	58 - 104	21	50 - 115	50 - 115	50	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
3,3'-Dichlorobenzidine	57 - 105	57 - 105	25	20 - 110	20 - 110	50	N/A	N/A	N/A
Dibenzo(a,h)antracene	62 - 112	62 - 112	20	40 - 125	40 - 125	50	N/A	N/A	N/A
Dibenzofuran	61 - 108	61 - 108	20	55 - 105	55 - 105	50	N/A	N/A	N/A
Di-n-butyl phthalate	62 - 109	62 - 109	20	55 - 115	55 - 115	50	N/A	N/A	N/A
Di-n-octyl phthalate	60 - 120	60 - 120	24	35 - 135	35 - 135	50	N/A	N/A	N/A
Diethyl phthalate	62 - 109	62 - 109	19	40 - 120	40 - 120	50	N/A	N/A	N/A
Dimethyl phthalate	63 - 106	63 - 106	19	25 - 125	25 - 125	50	N/A	N/A	N/A
Diphenylamine	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	59 - 116	59 - 116	21	40 - 125	40 - 125	50	N/A	N/A	N/A
Fluoranthene	65 - 114	65 - 114	21	55 - 115	55 - 115	50	N/A	N/A	N/A
Fluorene	61 - 106	61 - 106	19	50 - 110	50 - 110	50	N/A	N/A	N/A
Hexachlorobenzene	62 - 107	62 - 107	20	50 - 110	50 - 110	50	N/A	N/A	N/A
Hexachlorobutadiene	38 - 107	38 - 107	30	25 - 105	25 - 105	50	N/A	N/A	N/A
Hexachlorocyclopentadiene	19 - 84	19 - 84	35	30 - 145	30 - 145	50	N/A	N/A	N/A
Hexachloroethane	35 - 101	30 - 101	29	30 - 95	30 - 95	50	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	61 - 113	61 - 113	20	45 - 125	45 - 125	50	N/A	N/A	N/A
Isophorone	56 - 111	56 - 111	26	50 - 110	50 - 110	50	N/A	N/A	N/A
2-Metlhyl-4,6-dinitrophenol	N/A	N/A	N/A	45 - 135	45 - 135	50	N/A	N/A	N/A
2-Methylnaphthalene	56 - 112	56 - 112	26	45 - 105	45 - 105	50	N/A	N/A	N/A
2-Nitroaniline	60 - 109	60 - 109	20	50 - 115	50 - 115	50	N/A	N/A	N/A
3-Nitroaniline	52 - 107	52 - 107	21	20 - 125	20 - 125	50	N/A	N/A	N/A
4-Nitroaniline	59 - 111	59 - 111	21	35 - 120	35 - 120	50	N/A	N/A	N/A
Naphthalene	50 - 104	50 - 104	28	40 - 100	40 - 100	50	N/A	N/A	N/A
Nitrobenzene	52 - 105	52 - 105	28	45 - 110	45 - 110	50	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	51 - 104	51 - 104	28	35 - 130	35 - 130	50	37 - 121	37 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	20 - 115	20 - 115	50	N/A	N/A	N/A
N-Nitrosodiphenylamine	57 - 110	57 - 110	19	50 - 110	50 - 110	50	N/A	N/A	N/A
Phenanthrene	65 - 108	65 - 108	20	50 - 115	50 - 115	50	N/A	N/A	N/A
Pyrene	60 - 113	60 - 113	20	50 - 130	50 - 130	50	55 - 120	55 - 120	30
1,2,4-Trichlorobenzene	45 - 104	45 - 104	28	35 - 105	35 - 105	50	25 - 110	25 - 110	30
Nitroaromatics and Nitroamines, SW-846 8330									
HMX	74 - 152	74 - 152	21	80 - 115	80 - 115	30	80 - 115	80 - 115	30
RDX	80 - 124	80 - 124	20	50 - 160	50 - 160	30	50 - 160	50 - 160	30
1,3-Dinitrobenzene	84 - 123	84 - 123	23	45 - 160	45 - 160	30	45 - 160	45 - 160	30
2,6-Dinitrotoluene	84 - 133	84 - 133	23	60 - 135	60 - 135	30	60 - 135	60 - 135	30
2,4-Dinitrotoluene	77 - 116	77 - 116	26	60 - 135	60 - 135	30	60 - 135	60 - 135	30
2-amino-4,6-Dinitrotoluene	78 - 117	78 - 117	28	55 - 155	55 - 155	30	55 - 155	55 - 155	30
4-amino-2,6-Dinitrotoluene	84 - 123	84 - 123	27	55 - 155	55 - 155	30	55 - 155	55 - 155	30

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Nitrobenzene	76 - 128	76 - 128	28	50 - 140	50 - 140	30	50 - 140	50 - 140	30
o-Nitrotoluene	76 - 120	76 - 120	30	50 - 130	50 - 130	30	50 - 130	50 - 130	30
m-Nitrotoluene	74 - 124	74 - 124	32	45 - 135	45 - 135	30	45 - 135	45 - 135	30
p-Nitrotoluene	81 - 125	81 - 125	34	50 - 130	50 - 130	30	50 - 130	50 - 130	30
Tetryl	62 - 117	62 - 117	28	20 - 175	20 - 175	30	20 - 175	20 - 175	30
1,3,5-Trinitrobenzene	85 - 127	85 - 127	21	65 - 140	65 - 140	30	65 - 140	65 - 140	30
2,4,6-Trinitrotoluene	71 - 128	71 - 128	21	50 - 145	50 - 145	30	50 - 145	50 - 145	30
Nitroglycerin	N/A	N/A	N/A	N/A	N/A	N/A	76 - 116	76 - 116	30
PETN	N/A	N/A	N/A	N/A	N/A	N/A	69 - 117	69 - 117	30
PCBs, SW-846 8082									
Aroclor-1016	76 - 117	76 - 117	16	N/A	N/A	N/A	44 - 119	10 - 199	30
Aroclor-1260	65 - 117	65 - 117	23	N/A	N/A	N/A	41 - 118	10 - 199	30
Metals, SW-846 6010B/6020A/7470A									
Aluminum	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	80 - 120	25	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Water Quality									
Chloride	90 - 110	90 - 110	20	90 - 110	90 - 110	20	90 - 110	80 - 120	20

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works

Spiked Compound	Accutest			AML			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Hardness as CaCO3	N/A	N/A	N/A	N/A	N/A	N/A	88 - 110	87 - 114	20
Nitrate	90 - 110	90 - 110	20	80 - 120	80 - 120	20	90 - 110	34 - 125	20
Sulfate	90 - 110	90 - 110	20	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Total Alkalinity	90 - 113	90 - 113	20	70 - 130	N/A	N/A	90 - 127	10 - 160	24
Total Cyanide	90 - 110	90 - 110	20	75 - 125	75 - 125	25	69 - 118	42 - 140	20
Total Dissolved Solids	N/A	N/A	5	75 - 125	N/A	N/A	88 - 110	N/A	20
Total Suspended Solids	N/A	N/A	5	75 - 125	N/A	N/A	73 - 113	N/A	20
Turbidity	N/A	N/A	8	N/A	N/A	N/A	75 - 125	N/A	20

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

APPENDIX H

CHEMICAL ANALYTICAL DATA SUMMARY

Groundwater Analytical Data Summary

Location Code:				AP1-BEDGW-001			AP1-BEDGW-001			AP1-BEDGW-002		
Sample Number;				AP3053			AP3073			AP3054		
Sample Date:				9-May-09			6-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	9.03			6.31			8.71		
Field Tests	FERROUS IRON	N	mg/L	0			0			0		
Field Tests	Oxidation Reduction Potential	N	mV	-513.8			-6.3			-418.9		
Field Tests	pH	N	pH_units	6.52			6.66			6.43		
Field Tests	Specific Conductivity	N	mS/cm	13.78			14.24			6.421		
Field Tests	Temperature	N	C	11.03			10.95			9.81		
Field Tests	Turbidity	N	NTU	218.9			5.4			0		
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	HMX	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Nitrobenzene	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Nitrotoluene, 2-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Nitrotoluene, 3-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Nitrotoluene, 4-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	RDX	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Tetryl	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.2	U	U	0.38	U	UJ	0.19	U	UJ
Metals - Unfiltered	Aluminum	N	ug/L	57.2	B	J	45.3	B	J	67.5	B	J
Metals - Unfiltered	Antimony	N	ug/L	12	U	U	6	U	U	5.8	B	J
Metals - Unfiltered	Arsenic	N	ug/L	69.7			110			101		
Metals - Unfiltered	Barium	N	ug/L	897			989			555		
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U	4	U	U	4	U	U
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U	5	U	U	5	U	U
Metals - Unfiltered	Calcium	N	ug/L	573000			590000			246000		
Metals - Unfiltered	Chromium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Cobalt	N	ug/L	50	U	U	50	U	U	50	U	U
Metals - Unfiltered	Copper	N	ug/L	25	U	U	25	U	U	25	U	U
Metals - Unfiltered	Iron	N	ug/L	4910			1570			322		
Metals - Unfiltered	Lead	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Magnesium	N	ug/L	418000			479000			155000		
Metals - Unfiltered	Manganese	N	ug/L	857			704			548		
Metals - Unfiltered	Mercury	N	ug/L	1	U	U	1	U	U	1	U	U
Metals - Unfiltered	Nickel	N	ug/L	5.8	B	J	2.8	B	J	40	U	U
Metals - Unfiltered	Potassium	N	ug/L	110000			129000			59600		
Metals - Unfiltered	Selenium	N	ug/L	11.9	B	J	20	U	U	6.3	B	J
Metals - Unfiltered	Silver	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Sodium	N	ug/L	1300000			1470000			573000		
Metals - Unfiltered	Thallium	N	ug/L	5.3	B	J	10	U	U	10	U	U
Metals - Unfiltered	Vanadium	N	ug/L	2.2	B	J	50	U	U	2.6	B	J
Metals - Unfiltered	Zinc	N	ug/L	11.5	B	J	8	B	B	16	B	J
Metals - Filtered	Aluminum	Y	ug/L	23.2	B	J	26.1	B	J	409		
Metals - Filtered	Antimony	Y	ug/L	12	U	U	6	U	U	5.4	B	J
Metals - Filtered	Arsenic	Y	ug/L	65.6			133			77.7		
Metals - Filtered	Barium	Y	ug/L	813			961			307		

Location Code:				AP1-BEDGW-001			AP1-BEDGW-001			AP1-BEDGW-002		
Sample Number;				AP3053			AP3073			AP3054		
Sample Date:				9-May-09			6-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Beryllium	Y	ug/L	4	U	U	4	U	U	4	U	U
Metals - Filtered	Cadmium	Y	ug/L	5	U	U	5	U	U	5	U	U
Metals - Filtered	Calcium	Y	ug/L	521000			596000			153000		
Metals - Filtered	Chromium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Cobalt	Y	ug/L	50	U	U	50	U	U	50	U	U
Metals - Filtered	Copper	Y	ug/L	25	U	U	25	U	U	43.1		
Metals - Filtered	Iron	Y	ug/L	300	U	U	77.4	B	J	124	B	J
Metals - Filtered	Lead	Y	ug/L	10	U	U	10	U	U	7.5	B	J
Metals - Filtered	Magnesium	Y	ug/L	427000			471000			96800		
Metals - Filtered	Manganese	Y	ug/L	804			658			379		
Metals - Filtered	Mercury	Y	ug/L	1	U	U	1	U	U	1	U	U
Metals - Filtered	Nickel	Y	ug/L	3.8	B	J	40	U	U	55.2		
Metals - Filtered	Potassium	Y	ug/L	107000			131000			45300		
Metals - Filtered	Selenium	Y	ug/L	16.7	B	J	20	U	U	15	B	J
Metals - Filtered	Silver	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Sodium	Y	ug/L	1300000			1410000			644000		
Metals - Filtered	Thallium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Vanadium	Y	ug/L	2	B	J	50	U	U	3.1	B	J
Metals - Filtered	Zinc	Y	ug/L	8.3	B	J	20	U	U	140		
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	9	J	J	8	J	J	4.8	U	U
Semivolatiles	Acenaphthene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Acenaphthylene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Anthracene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzo(a)anthracene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Benzoic acid	N	ug/L	96	U	U	99	U	U	24	U	U
Semivolatiles	Benzyl alcohol	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Carbazole	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Chrysene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dibenzofuran	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	19	U	U	20	U	U	4.8	U	U

Location Code:				AP1-BEDGW-001			AP1-BEDGW-001			AP1-BEDGW-002		
Sample Number;				AP3053			AP3073			AP3054		
Sample Date:				9-May-09			6-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	38	U	U	40	U	U	9.5	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	24.7			20.7			2	J	J
Semivolatiles	Di-n-butyl phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	38	U	U	40	U	U	9.5	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	96	U	U	99	U	U	24	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Fluoranthene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Fluorene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Hexachloroethane	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Isophorone	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	36.2			32.7			14.5		
Semivolatiles	Methylphenol, 2-	N	ug/L	6.9	J	J	6.2	J	J	4.8	U	U
Semivolatiles	Naphthalene	N	ug/L	33			33.2			11.8		
Semivolatiles	Nitroaniline, 2-	N	ug/L	38	U	U	40	U	U	9.5	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	38	U	U	40	U	U	9.5	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	38	U	U	40	U	U	9.5	U	U
Semivolatiles	Nitrobenzene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	96	U	U	99	U	U	24	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	96	U	U	99	U	U	24	U	U
Semivolatiles	Phenanthrene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Phenol	N	ug/L	6.6	J	J	6.6	J	J	4.8	U	U
Semivolatiles	Pyrene	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	19	U	U	20	U	U	4.8	U	U
Volatiles	Acetone	N	ug/L	140	J	J	463	J	J	50	U	R
Volatiles	Benzene	N	ug/L	613			1300			67.1		
Volatiles	Bromodichloromethane	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Bromoform	N	ug/L	10	U	UJ	20	U	U	2	U	UJ
Volatiles	Bromomethane	N	ug/L	20	U	U	40	U	U	4	U	U
Volatiles	Butanone, 2-	N	ug/L	71.5			299			10.9		
Volatiles	Carbon disulfide	N	ug/L	12.3	JB	J	40	U	U	3	JB	J
Volatiles	Carbon tetrachloride	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Chlorobenzene	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Chloroethane	N	ug/L	20	U	UJ	40	U	U	4	U	UJ
Volatiles	Chloroform	N	ug/L	18			20	U	U	2	U	U

Location Code:				AP1-BEDGW-001			AP1-BEDGW-001			AP1-BEDGW-002		
Sample Number;				AP3053			AP3073			AP3054		
Sample Date:				9-May-09			6-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Volatiles	Chloromethane	N	ug/L	20	U	U	40	U	U	4	U	U
Volatiles	Dibromochloromethane	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloroethane, 1,1-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloroethane, 1,2-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloroethene, 1,1-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloroethene, cis-1,2-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloroethene, trans-1,2-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloropropane, 1,2-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloropropene, cis-1,3-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Dichloropropene, trans-1,3-	N	ug/L	10	U	UJ	20	U	U	2	U	U
Volatiles	Ethylbenzene	N	ug/L	126			176			45.6		
Volatiles	Hexanone, 2-	N	ug/L	100	U	U	200	U	U	20	U	U
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	50	U	U	100	U	U	10	U	U
Volatiles	Methylene chloride	N	ug/L	11.2	JB	B	28.8	J	J	3	JB	B
Volatiles	Styrene	N	ug/L	10	U	UJ	20	U	U	2	U	UJ
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	10	U	U	20	U	U	0.53	J	J
Volatiles	Tetrachloroethene	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Toluene	N	ug/L	490			730			69.2		
Volatiles	Trichloroethane, 1,1,1-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Trichloroethane, 1,1,2-	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Trichloroethene	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Vinyl chloride	N	ug/L	10	U	U	20	U	U	2	U	U
Volatiles	Xylenes, total	N	ug/L	1060			1340			473		
Water Quality Parameters	Alkalinity	N	ppm	386			453			678		
Water Quality Parameters	Chloride	N	ppm	2840			4280			705		
Water Quality Parameters	Cyanide, total	N	ppm	0.037		J	0.01	U	U	0.12		J
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	3150			3450			1250		
Water Quality Parameters	Nitrate-Nitrite	N	ppm	2	U	U	0.046	B	J	2	U	U
Water Quality Parameters	Sulfate	N	ppm	13.6			50	U	UJ	93.4		
Water Quality Parameters	Total dissolved solids	N	ppm	9580			7680			3130		
Water Quality Parameters	Total suspended solids	N	ppm	250			26			88		
Water Quality Parameters	Turbidity	N	NTU	35.1		J	296			6.3		J

Location Code:				AP1-BEDGW-002			IT-MNTA-BEDGW-001			IT-MNTA-BEDGW-001		
Sample Number;				AP3074			LB3074			BEDGW-001-1109		
Sample Date:				10-Nov-09			19-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	8.52			0.28			3.85		
Field Tests	FERROUS IRON	N	mg/L	0			0			0		
Field Tests	Oxidation Reduction Potential	N	mV	-25.3			-200.8			-19		
Field Tests	pH	N	pH_units	7.08			6.44			6.89		
Field Tests	Specific Conductivity	N	mS/cm	6.467			10.53			9.365		
Field Tests	Temperature	N	C	10.54			15.17			9.53		
Field Tests	Turbidity	N	NTU	33.2			21.5			13.6		
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	HMX	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Nitrobenzene	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Nitrotoluene, 2-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Nitrotoluene, 3-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Nitrotoluene, 4-	N	ug/L	0.2	U	U	0.19	U	UJ	0.23	U	UJ
Explosives	RDX	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Tetryl	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.2	U	UJ	0.19	U	UJ	0.23	U	UJ
Metals - Unfiltered	Aluminum	N	ug/L	46.7	B	J	90.4	B	B	79.6	B	J
Metals - Unfiltered	Antimony	N	ug/L	6	U	U	6	U	U	6	U	U
Metals - Unfiltered	Arsenic	N	ug/L	50.7			10	U	U	10	U	U
Metals - Unfiltered	Barium	N	ug/L	434			343			305		
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U	4	U	U	4	U	U
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U	1.4	B	J	5	U	U
Metals - Unfiltered	Calcium	N	ug/L	220000			314000		J	280000		
Metals - Unfiltered	Chromium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Cobalt	N	ug/L	50	U	U	50	U	U	50	U	U
Metals - Unfiltered	Copper	N	ug/L	25	U	U	25	U	U	25	U	U
Metals - Unfiltered	Iron	N	ug/L	335		J	591			180	B	J
Metals - Unfiltered	Lead	N	ug/L	5	U	U	2.6	B	J	5	U	U
Metals - Unfiltered	Magnesium	N	ug/L	155000			234000			212000		
Metals - Unfiltered	Manganese	N	ug/L	38			95.5			85.8		
Metals - Unfiltered	Mercury	N	ug/L	1	U	U	1	U	U	1	U	U
Metals - Unfiltered	Nickel	N	ug/L	40	U	U	40	U	U	40	U	U
Metals - Unfiltered	Potassium	N	ug/L	88800		J	111000			120000		
Metals - Unfiltered	Selenium	N	ug/L	5.2	B	J	10	U	U	20	U	U
Metals - Unfiltered	Silver	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Sodium	N	ug/L	889000			1230000			1130000		
Metals - Unfiltered	Thallium	N	ug/L	10	U	U	3.8	B	J	10	U	U
Metals - Unfiltered	Vanadium	N	ug/L	1.3	B	J	2.8	B	J	1.6	B	J
Metals - Unfiltered	Zinc	N	ug/L	7.7	B	J	11.6	B	J	11.5	B	B
Metals - Filtered	Aluminum	Y	ug/L	24.8	B	J	43.3	B	J	52.6	B	J
Metals - Filtered	Antimony	Y	ug/L	6	U	U	6	U	U	6	U	U
Metals - Filtered	Arsenic	Y	ug/L	36.7			10	U	U	10	U	U
Metals - Filtered	Barium	Y	ug/L	406			329			304		

Location Code:				AP1-BEDGW-002			IT-MNTA-BEDGW-001			IT-MNTA-BEDGW-001		
Sample Number;				AP3074			LB3074			BEDGW-001-1109		
Sample Date:				10-Nov-09			19-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Beryllium	Y	ug/L	4	U	U	4	U	U	4	U	U
Metals - Filtered	Cadmium	Y	ug/L	5	U	U	5	U	U	5	U	U
Metals - Filtered	Calcium	Y	ug/L	200000			312000			275000		
Metals - Filtered	Chromium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Cobalt	Y	ug/L	50	U	U	50	U	U	50	U	U
Metals - Filtered	Copper	Y	ug/L	25	U	U	25	U	U	25	U	U
Metals - Filtered	Iron	Y	ug/L	300	U	U	300	U	U	300	U	U
Metals - Filtered	Lead	Y	ug/L	5	U	U	2	B	J	2.3	B	J
Metals - Filtered	Magnesium	Y	ug/L	148000			231000			211000		
Metals - Filtered	Manganese	Y	ug/L	10.5	B	J	47			70.2		
Metals - Filtered	Mercury	Y	ug/L	1	U	U	1	U	U	1	U	U
Metals - Filtered	Nickel	Y	ug/L	40	U	U	40	U	U	40	U	U
Metals - Filtered	Potassium	Y	ug/L	84800		J	113000			120000		
Metals - Filtered	Selenium	Y	ug/L	4	B	J	10	U	U	4.2	B	J
Metals - Filtered	Silver	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Sodium	Y	ug/L	833000			1210000			1160000		
Metals - Filtered	Thallium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Vanadium	Y	ug/L	50	U	U	2.7	B	J	0.93	B	J
Metals - Filtered	Zinc	Y	ug/L	20	U	U	11.2	B	J	20	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	0.97	J	J	20	U	U	100	U	UJ
Semivolatiles	Acenaphthene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Acenaphthylene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Anthracene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzo(a)anthracene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzo(a)pyrene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzo(ghi)perylene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Benzoic acid	N	ug/L	24	U	U	100	U	U	500	U	UJ
Semivolatiles	Benzyl alcohol	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Butyl benzyl phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Carbazole	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chloroaniline, 4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chlorophenol, 2-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Chrysene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dibenzofuran	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ

Location Code:				AP1-BEDGW-002			IT-MNTA-BEDGW-001			IT-MNTA-BEDGW-001		
Sample Number;				AP3074			LB3074			BEDGW-001-1109		
Sample Date:				10-Nov-09			19-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	9.7	U	U	40	U	U	200	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Diethyl phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dimethyl phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	2.8	J	J	20	U	U	100	U	UJ
Semivolatiles	Di-n-butyl phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	9.7	U	U	40	U	U	200	U	UJ
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	24	U	U	100	U	U	500	U	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Di-n-octyl phthalate	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Fluoranthene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Fluorene	N	ug/L	4.9	U	U	5.4	J	J	100	U	UJ
Semivolatiles	Hexachlorobenzene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Hexachlorobutadiene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Hexachloroethane	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Isophorone	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	14.5			71			256		J
Semivolatiles	Methylphenol, 2-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Naphthalene	N	ug/L	15.3			17.7	J	J	64.9	J	J
Semivolatiles	Nitroaniline, 2-	N	ug/L	9.7	U	U	40	U	U	200	U	UJ
Semivolatiles	Nitroaniline, 3-	N	ug/L	9.7	U	U	40	U	U	200	U	UJ
Semivolatiles	Nitroaniline, 4-	N	ug/L	9.7	U	U	40	U	U	200	U	UJ
Semivolatiles	Nitrobenzene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Nitrophenol, 2-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Nitrophenol, 4-	N	ug/L	24	U	U	100	U	U	500	U	UJ
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Pentachlorophenol	N	ug/L	24	U	U	100	U	U	500	U	UJ
Semivolatiles	Phenanthrene	N	ug/L	4.9	U	U	12.7	J	J	37.3	J	J
Semivolatiles	Phenol	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Pyrene	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	4.9	U	U	20	U	U	100	U	UJ
Volatiles	Acetone	N	ug/L	92.9		B	345	J	J	25	U	U
Volatiles	Benzene	N	ug/L	27.5			20	U	U	3.7		
Volatiles	Bromodichloromethane	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Bromoform	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Bromomethane	N	ug/L	4	U	U	40	U	U	2	U	U
Volatiles	Butanone, 2-	N	ug/L	10	U	U	81.3	J	J	5	U	U
Volatiles	Carbon disulfide	N	ug/L	1.9	J	J	11.6	JB	J	3.8		
Volatiles	Carbon tetrachloride	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Chlorobenzene	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Chloroethane	N	ug/L	4	U	U	40	U	UJ	2	U	U
Volatiles	Chloroform	N	ug/L	12			66.7			1	U	U

Location Code:				AP1-BEDGW-002			IT-MNTA-BEDGW-001			IT-MNTA-BEDGW-001		
Sample Number;				AP3074			LB3074			BEDGW-001-1109		
Sample Date:				10-Nov-09			19-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Volatiles	Chloromethane	N	ug/L	216			40	U	U	2	U	U
Volatiles	Dibromochloromethane	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloroethane, 1,1-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloroethane, 1,2-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloroethene, 1,1-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloroethene, cis-1,2-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloroethene, trans-1,2-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloropropane, 1,2-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloropropene, cis-1,3-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Dichloropropene, trans-1,3-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Ethylbenzene	N	ug/L	30.9			16.7	J	J	9.9		
Volatiles	Hexanone, 2-	N	ug/L	20	U	U	200	U	U	10	U	U
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	10	U	U	100	U	U	3.3	J	J
Volatiles	Methylene chloride	N	ug/L	10	U	U	77.6	JB	J	5	U	U
Volatiles	Styrene	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	2	U	U	20	U	U	1.2		
Volatiles	Tetrachloroethene	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Toluene	N	ug/L	43.6			14.2	J	J	10		
Volatiles	Trichloroethane, 1,1,1-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Trichloroethane, 1,1,2-	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Trichloroethene	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Vinyl chloride	N	ug/L	2	U	U	20	U	U	1	U	U
Volatiles	Xylenes, total	N	ug/L	370			235			136		
Water Quality Parameters	Alkalinity	N	ppm	728			773			718		
Water Quality Parameters	Chloride	N	ppm	2020		J	132			2550		
Water Quality Parameters	Cyanide, total	N	ppm	0.01	U	U	0.071			0.01	U	U
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm				1740			1570		
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.19		J	4	U	U	0.09	B	J
Water Quality Parameters	Sulfate	N	ppm	100	U	U	9.6			50	U	UJ
Water Quality Parameters	Total dissolved solids	N	ppm	3520			5780			4680		
Water Quality Parameters	Total suspended solids	N	ppm	130			53			193		
Water Quality Parameters	Turbidity	N	NTU	180		J	66		J	71.5		

Groundwater Analytical Data Summary

Location Code:				AP1-MW01			AP1-MW01			AP1-MW02		
Sample Number;				AP3050			AP3070			AP3051		
Sample Date:				7-May-09			4-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	1.85			1.65			9.82		
Field Tests	FERROUS IRON	N	mg/L	4			2			0		
Field Tests	Oxidation Reduction Potential	N	mV	-13.7			4.6			-320.8		
Field Tests	pH	N	pH_units	6.56			6.76			6.75		
Field Tests	Specific Conductivity	N	mS/cm	1.75			1.64			2.011		
Field Tests	Temperature	N	C	11.16			10.76			11.8		
Field Tests	Turbidity	N	NTU	10.5			11.3			0		
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	HMX	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Nitrobenzene	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.19	U	U	0.18	J	J	0.19	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.19	U	U	0.17	J	J	0.19	U	U
Explosives	RDX	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Tetryl	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.19	U	U	0.2	U	U	0.19	U	U
Metals - Unfiltered	Aluminum	N	ug/L	26.1	B	J	191	B	J	76.8	B	J
Metals - Unfiltered	Antimony	N	ug/L	6	U	U	6	U	U	6	U	U
Metals - Unfiltered	Arsenic	N	ug/L	10	U	U	5.4	B	J	10	U	U
Metals - Unfiltered	Barium	N	ug/L	28.6	B	J	37.8	B	J	61	B	J
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U	4	U	U	4	U	U
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U	5	U	U	5	U	U
Metals - Unfiltered	Calcium	N	ug/L	282000			194000			207000		
Metals - Unfiltered	Chromium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Cobalt	N	ug/L	22.2	B	J	6.8	B	J	3	B	J
Metals - Unfiltered	Copper	N	ug/L	25	U	U	25	U	U	25	U	U
Metals - Unfiltered	Iron	N	ug/L	4610			4410			300	U	U
Metals - Unfiltered	Lead	N	ug/L	4.3	B	J	2.6	B	B	10	U	U
Metals - Unfiltered	Magnesium	N	ug/L	77100			63200			92400		
Metals - Unfiltered	Manganese	N	ug/L	32300			8290			351		
Metals - Unfiltered	Mercury	N	ug/L	1	U	U	1	U	U	1	U	U
Metals - Unfiltered	Nickel	N	ug/L	13.3	B	J	4.1	B		15.2	B	J
Metals - Unfiltered	Potassium	N	ug/L	2820	B	J	6650	B	J	28200		
Metals - Unfiltered	Selenium	N	ug/L	10	U	U	20	U	U	4.9	B	J
Metals - Unfiltered	Silver	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Sodium	N	ug/L	18900			42900			68400		
Metals - Unfiltered	Thallium	N	ug/L	34.6			10	U	U	10	U	U
Metals - Unfiltered	Vanadium	N	ug/L	50	U	U	50	U	U	1.2	B	J
Metals - Unfiltered	Zinc	N	ug/L	23.2			8.6	B	B	13.4	B	J
Metals - Filtered	Aluminum	Y	ug/L	200	U	U	200	U	U	15.5	B	J
Metals - Filtered	Antimony	Y	ug/L	6	U	U	6	U	U	6	U	U
Metals - Filtered	Arsenic	Y	ug/L	10	U	U	6.2	B	J	10	U	U
Metals - Filtered	Barium	Y	ug/L	28.4	B	J	34.9	B	J	61.7	B	J

Location Code:				AP1-MW01			AP1-MW01			AP1-MW02		
Sample Number;				AP3050			AP3070			AP3051		
Sample Date:				7-May-09			4-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Beryllium	Y	ug/L	4	U	U	4	U	U	4	U	U
Metals - Filtered	Cadmium	Y	ug/L	5	U	U	5	U	U	5	U	U
Metals - Filtered	Calcium	Y	ug/L	283000			181000			201000		
Metals - Filtered	Chromium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Cobalt	Y	ug/L	22.5	B	J	5.1	B	J	3.2	B	J
Metals - Filtered	Copper	Y	ug/L	25	U	U	25	U	U	25	U	U
Metals - Filtered	Iron	Y	ug/L	4590			4990			600	U	U
Metals - Filtered	Lead	Y	ug/L	5.8			5	U	U	2	B	J
Metals - Filtered	Magnesium	Y	ug/L	77600			61000			90800		
Metals - Filtered	Manganese	Y	ug/L	32100			6270			355		
Metals - Filtered	Mercury	Y	ug/L	1	U	U	1	U	U	1	U	U
Metals - Filtered	Nickel	Y	ug/L	12.8	B	J	3.9	B	J	14.8	B	J
Metals - Filtered	Potassium	Y	ug/L	2760	B	J	7000	B	J	28500		
Metals - Filtered	Selenium	Y	ug/L	10	U	U	20	U	U	6.9	B	J
Metals - Filtered	Silver	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Sodium	Y	ug/L	21000			44300			69900		
Metals - Filtered	Thallium	Y	ug/L	37.8			10	U	U	10	U	U
Metals - Filtered	Vanadium	Y	ug/L	50	U	U	50	U	U	1.1	B	J
Metals - Filtered	Zinc	Y	ug/L	23.2			9.2	B	J	12.1	B	J
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Acenaphthene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Acenaphthylene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Anthracene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzo(a)anthracene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Benzoic acid	N	ug/L	24	U	U	24	U	U	24	U	U
Semivolatiles	Benzyl alcohol	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Carbazole	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Chrysene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dibenzofuran	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U

Location Code:				AP1-MW01			AP1-MW01			AP1-MW02		
Sample Number;				AP3050			AP3070			AP3051		
Sample Date:				7-May-09			4-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	9.6	U	U	9.5	U	U	9.6	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Di-n-butyl phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	9.6	U	U	9.5	U	U	9.6	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	24	U	U	24	U	U	24	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Fluoranthene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Fluorene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Hexachloroethane	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Isophorone	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Methylphenol, 2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Naphthalene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Nitroaniline, 2-	N	ug/L	9.6	U	U	9.5	U	U	9.6	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	9.6	U	U	9.5	U	U	9.6	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	9.6	U	U	9.5	U	U	9.6	U	U
Semivolatiles	Nitrobenzene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	24	U	U	24	U	U	24	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	24	U	U	24	U	U	24	U	U
Semivolatiles	Phenanthrene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Phenol	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Pyrene	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	4.8	U	U	4.8	U	U	4.8	U	U
Volatiles	Acetone	N	ug/L	25	U	U	25	U	R	25	U	R
Volatiles	Benzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromodichloromethane	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromoform	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromomethane	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Butanone, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Carbon disulfide	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Carbon tetrachloride	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Chlorobenzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Chloroethane	N	ug/L	2	U	U	2	U	U	2	U	UJ
Volatiles	Chloroform	N	ug/L	0.48	J	J	1	U	U	1	U	U

Location Code:				AP1-MW01			AP1-MW01			AP1-MW02		
Sample Number;				AP3050			AP3070			AP3051		
Sample Date:				7-May-09			4-Nov-09			10-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Volatiles	Chloromethane	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Dibromochloromethane	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethane, 1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethane, 1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, 1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, cis-1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, trans-1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropane, 1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropene, cis-1,3-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropene, trans-1,3-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Ethylbenzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Hexanone, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Methylene chloride	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Styrene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Tetrachloroethene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Toluene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethane, 1,1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethane, 1,1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Vinyl chloride	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Xylenes, total	N	ug/L	3	U	U	3	U	U	3	U	U
Water Quality Parameters	Alkalinity	N	ppm	448			395			253		
Water Quality Parameters	Chloride	N	ppm	11.5			40			25.6		
Water Quality Parameters	Cyanide, total	N	ppm	0.01	U	UJ	0.01	U	U	0.01	U	UJ
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	1020			745			897		
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.1	U	U	0.13		J	2	U	U
Water Quality Parameters	Sulfate	N	ppm	585			311		J	589		
Water Quality Parameters	Total dissolved solids	N	ppm	1520			1080			1890		
Water Quality Parameters	Total suspended solids	N	ppm	10	U	U	25			23		
Water Quality Parameters	Turbidity	N	NTU	8.6			47			5.4		J

Location Code:				AP1-MW02			AP1-MW03			AP1-MW03		
Sample Number;				AP3071			AP3052			AP3072		
Sample Date:				6-Nov-09			11-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	6.98			9.81			1.24		
Field Tests	FERROUS IRON	N	mg/L	0						0		
Field Tests	Oxidation Reduction Potential	N	mV	-24.9			-261.8			-12.9		
Field Tests	pH	N	pH_units	7.28			6.68			7.13		
Field Tests	Specific Conductivity	N	mS/cm	1.82			0.982			1.2		
Field Tests	Temperature	N	C	10.29			8.72			11.72		
Field Tests	Turbidity	N	NTU	-2.3			0			16.6		
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	HMX	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Nitrobenzene	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	RDX	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Tetryl	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.2	U	U	0.19	U	U	0.2	U	U
Metals - Unfiltered	Aluminum	N	ug/L	68.7	B	J	1110		J	17.2	B	J
Metals - Unfiltered	Antimony	N	ug/L	6	U	U	6	U	U	6	U	U
Metals - Unfiltered	Arsenic	N	ug/L	10	U	U	10	U	U	6.3	B	J
Metals - Unfiltered	Barium	N	ug/L	53.1	B	J	252			154	B	J
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U	4	U	U	4	U	U
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U	5	U	U	5	U	U
Metals - Unfiltered	Calcium	N	ug/L	169000			93400			94300		
Metals - Unfiltered	Chromium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Cobalt	N	ug/L	3.6	B	J	1	B	J	2.7	B	J
Metals - Unfiltered	Copper	N	ug/L	25	U	U	25	U	U	25	U	U
Metals - Unfiltered	Iron	N	ug/L	300	U	U	1090			300	U	U
Metals - Unfiltered	Lead	N	ug/L	2	B	B	2.2	B	J	2.4	B	B
Metals - Unfiltered	Magnesium	N	ug/L	74900			39100			38700		
Metals - Unfiltered	Manganese	N	ug/L	436			136			463		
Metals - Unfiltered	Mercury	N	ug/L	1	U	U	1	U	U	1	U	U
Metals - Unfiltered	Nickel	N	ug/L	5.8	B	J	7.4	B	J	4.7	B	J
Metals - Unfiltered	Potassium	N	ug/L	21900			20700			19300		
Metals - Unfiltered	Selenium	N	ug/L	3.7	B	J	4.7	B	J	5.2	B	J
Metals - Unfiltered	Silver	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Sodium	N	ug/L	81300			52400			59300		
Metals - Unfiltered	Thallium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Vanadium	N	ug/L	50	U	U	2.9	B	J	50	U	U
Metals - Unfiltered	Zinc	N	ug/L	20	U	U	14.3	B	J	7.7	B	B
Metals - Filtered	Aluminum	Y	ug/L	12.8	B	J	19.1	B	J	3320		
Metals - Filtered	Antimony	Y	ug/L	6	U	U	6	U	U	6	U	U
Metals - Filtered	Arsenic	Y	ug/L	10	U	U	10	U	U	5.7	B	J
Metals - Filtered	Barium	Y	ug/L	51.6	B	J	255			177	B	J

Location Code:				AP1-MW02			AP1-MW03			AP1-MW03		
Sample Number;				AP3071			AP3052			AP3072		
Sample Date:				6-Nov-09			11-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Beryllium	Y	ug/L	4	U	U	4	U	U	4	U	U
Metals - Filtered	Cadmium	Y	ug/L	5	U	U	5	U	U	5	U	U
Metals - Filtered	Calcium	Y	ug/L	165000			90500			95500		
Metals - Filtered	Chromium	Y	ug/L	10	U	U	10	U	U	5.5	B	J
Metals - Filtered	Cobalt	Y	ug/L	3.6	B	J	50	U	U	5.1	B	J
Metals - Filtered	Copper	Y	ug/L	25	U	U	25	U	U	10.5	B	J
Metals - Filtered	Iron	Y	ug/L	300	U	U	300	U	U	6070		
Metals - Filtered	Lead	Y	ug/L	2.2	B	J	10	U	U	4.9	B	J
Metals - Filtered	Magnesium	Y	ug/L	75000			38400			39200		
Metals - Filtered	Manganese	Y	ug/L	410			102			550		
Metals - Filtered	Mercury	Y	ug/L	1	U	U	1	U	U	1	U	U
Metals - Filtered	Nickel	Y	ug/L	6.1	B	J	6.6	B	J	13.4	B	J
Metals - Filtered	Potassium	Y	ug/L	22000			20400			20500		
Metals - Filtered	Selenium	Y	ug/L	20	U	U	5.3	B	J	20	U	U
Metals - Filtered	Silver	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Sodium	Y	ug/L	81700			53900			60500		
Metals - Filtered	Thallium	Y	ug/L	10	U	U	10	U	U	10	U	U
Metals - Filtered	Vanadium	Y	ug/L	50	U	U	0.9	B	J	5.9	B	J
Metals - Filtered	Zinc	Y	ug/L	11.4	B	J	11.4	B	J	23.4		
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Acenaphthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Acenaphthylene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(a)anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzoic acid	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Benzyl alcohol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Carbazole	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chrysene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dibenzofuran	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	5	U	U	5	U	U	5	U	U

Location Code:				AP1-MW02			AP1-MW03			AP1-MW03		
Sample Number;				AP3071			AP3052			AP3072		
Sample Date:				6-Nov-09			11-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Di-n-butyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Fluorene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachloroethane	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Isophorone	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Methylphenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Naphthalene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitroaniline, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitrobenzene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Phenanthrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Phenol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Acetone	N	ug/L	25	U	U	25	U	R	25	U	U
Volatiles	Benzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromodichloromethane	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromoform	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Bromomethane	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Butanone, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Carbon disulfide	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Carbon tetrachloride	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Chlorobenzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Chloroethane	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Chloroform	N	ug/L	1	U	U	1	U	U	1	U	U

Location Code:				AP1-MW02			AP1-MW03			AP1-MW03		
Sample Number;				AP3071			AP3052			AP3072		
Sample Date:				6-Nov-09			11-May-09			6-Nov-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Volatiles	Chloromethane	N	ug/L	2	U	U	2	U	U	2	U	U
Volatiles	Dibromochloromethane	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethane, 1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethane, 1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, 1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, cis-1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloroethene, trans-1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropane, 1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropene, cis-1,3-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Dichloropropene, trans-1,3-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Ethylbenzene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Hexanone, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Methylene chloride	N	ug/L	5	U	U	5	U	U	5	U	U
Volatiles	Styrene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Tetrachloroethene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Toluene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethane, 1,1,1-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethane, 1,1,2-	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Trichloroethene	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Vinyl chloride	N	ug/L	1	U	U	1	U	U	1	U	U
Volatiles	Xylenes, total	N	ug/L	3	U	U	3	U	U	3	U	U
Water Quality Parameters	Alkalinity	N	ppm	313			349			391		
Water Quality Parameters	Chloride	N	ppm	35.4			38.7			37		
Water Quality Parameters	Cyanide, total	N	ppm	0.01	U	U	0.01	U	UJ			
Water Quality Parameters	HARDNESS (as CaCO3)	N	ppm	730			394			395		
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.041	B	J	2	U	U	0.055	B	J
Water Quality Parameters	Sulfate	N	ppm	358		J	127			109		
Water Quality Parameters	Total dissolved solids	N	ppm	1230			660			619		
Water Quality Parameters	Total suspended solids	N	ppm	6	B	J	78			300		
Water Quality Parameters	Turbidity	N	NTU	3.4			18.7			27.8		

Groundwater Analytical Summary

Location Code:				ASH PIT 1-PZ01			ASH PIT 1-PZ02			ASH PIT 1-PZ04		
Sample Number;				AP3000			AP3001			AP3003		
Sample Date:				12-Dec-08			11-Dec-08			15-Dec-08		
Sample Depth:				19 - 19 Ft			16 - 16 Ft			20 - 20 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	5.95			4.75			7.1		
Field Tests	FERROUS IRON	N	mg/L	0			0			0		
Field Tests	Oxidation Reduction Potential	N	mV	131.2			109.4			10.8		
Field Tests	pH	N	pH_units	7.36			6.85			7.14		
Field Tests	Specific Conductivity	N	mS/cm	0.832			0.679			2.46		
Field Tests	Temperature	N	C	10.12			10.34			10		
Field Tests	Turbidity	N	NTU	146.9			566.4			1000		
Cyanide	Cyanide, total	N	ppm	0.025	U	U	0.025	U	U			
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	HMX	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Nitrobenzene	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	RDX	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Tetryl	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.645	U	U	0.513	U	U	0.435	U	U
Metals - Unfiltered	Aluminum	N	ug/L	9740			3790					
Metals - Unfiltered	Antimony	N	ug/L	5.56	U	U	5.56	U	U			
Metals - Unfiltered	Arsenic	N	ug/L	11.1	U	U	11.1	U	U			
Metals - Unfiltered	Barium	N	ug/L	90.1			72.9					
Metals - Unfiltered	Beryllium	N	ug/L	4.44	U	U	4.44	U	U			
Metals - Unfiltered	Cadmium	N	ug/L	5.56	U	U	5.56	U	U			
Metals - Unfiltered	Calcium	N	ug/L	124000			118000					
Metals - Unfiltered	Chromium	N	ug/L	11.2			11.1	U	U			
Metals - Unfiltered	Cobalt	N	ug/L	4.44	U	U	2.91	J	J			
Metals - Unfiltered	Copper	N	ug/L	8.93	J	J	8.6	J	J			
Metals - Unfiltered	Iron	N	ug/L	7030			3400					
Metals - Unfiltered	Lead	N	ug/L	5.56	U	U	3.2	J	J			
Metals - Unfiltered	Magnesium	N	ug/L	34400			33000					
Metals - Unfiltered	Manganese	N	ug/L	71.4			306					
Metals - Unfiltered	Mercury	N	ug/L	0.2	U	U	0.2	U	U			
Metals - Unfiltered	Nickel	N	ug/L	4.07	J	J	4.51	J	J			
Metals - Unfiltered	Potassium	N	ug/L	4270			1680					
Metals - Unfiltered	Selenium	N	ug/L	11.1	U	U	11.1	U	U			
Metals - Unfiltered	Silver	N	ug/L	11.1	U	U	11.1	U	U			
Metals - Unfiltered	Sodium	N	ug/L	11500			9740					
Metals - Unfiltered	Thallium	N	ug/L	5.56	U	U	5.56	U	U			
Metals - Unfiltered	Vanadium	N	ug/L	19.4			8.07					
Metals - Unfiltered	Zinc	N	ug/L	55.6	U	U	55.6	U	U			
Metals - Filtered	Aluminum	Y	ug/L	88.9	U	U	88.9	U	U			
Metals - Filtered	Antimony	Y	ug/L	5.56	U	U	5.56	U	U			
Metals - Filtered	Arsenic	Y	ug/L	11.1	U	U	11.1	U	U			

Location Code:				ASH PIT 1-PZ01			ASH PIT 1-PZ02			ASH PIT 1-PZ04		
Sample Number;				AP3000			AP3001			AP3003		
Sample Date:				12-Dec-08			11-Dec-08			15-Dec-08		
Sample Depth:				19 - 19 Ft			16 - 16 Ft			20 - 20 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Barium	Y	ug/L	37.1			30.5					
Metals - Filtered	Beryllium	Y	ug/L	4.44	U	U	4.44	U	U			
Metals - Filtered	Cadmium	Y	ug/L	5.56	U	U	5.56	U	U			
Metals - Filtered	Calcium	Y	ug/L	131000			101000					
Metals - Filtered	Chromium	Y	ug/L	11.1	U	U	11.1	U	U			
Metals - Filtered	Cobalt	Y	ug/L	4.44	U	U	4.44	U	U			
Metals - Filtered	Copper	Y	ug/L	22.2	U	U	22.2	U	U			
Metals - Filtered	Iron	Y	ug/L	88.9	U	U	88.9	U	U			
Metals - Filtered	Lead	Y	ug/L	5.56	U	U	10.4					
Metals - Filtered	Magnesium	Y	ug/L	33200			27100					
Metals - Filtered	Manganese	Y	ug/L	10.7			35.2					
Metals - Filtered	Mercury	Y	ug/L	0.2	U	U	0.2	U	U			
Metals - Filtered	Nickel	Y	ug/L	6.67	U	U	6.67	U	U			
Metals - Filtered	Potassium	Y	ug/L	898			657					
Metals - Filtered	Selenium	Y	ug/L	11.1	U	U	11.1	U	U			
Metals - Filtered	Silver	Y	ug/L	11.1	U	U	11.1	U	U			
Metals - Filtered	Sodium	Y	ug/L	12000			11100					
Metals - Filtered	Thallium	Y	ug/L	5.56	U	U	5.08	J	J			
Metals - Filtered	Vanadium	Y	ug/L	4.44	U	U	4.44	U	U			
Metals - Filtered	Zinc	Y	ug/L	55.6	U	U	55.6	U	U			
Semivolatiles	Acenaphthene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Acenaphthylene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	ACETOPHENONE	N	ug/L									
Semivolatiles	Anthracene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Atrazine	N	ug/L									
Semivolatiles	Benzaldehyde	N	ug/L									
Semivolatiles	Benzo(a)anthracene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Benzoic acid	N	ug/L	10	U	U	11.2	U	U	10	U	UJ
Semivolatiles	Benzyl alcohol	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	BIBENZENE	N	ug/L									
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Caprolactam	N	ug/L									
Semivolatiles	Carbazole	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Chrysene	N	ug/L	10	U	U	11.2	U	U	10	U	U

Location Code:				ASH PIT 1-PZ01			ASH PIT 1-PZ02			ASH PIT 1-PZ04		
Sample Number;				AP3000			AP3001			AP3003		
Sample Date:				12-Dec-08			11-Dec-08			15-Dec-08		
Sample Depth:				19 - 19 Ft			16 - 16 Ft			20 - 20 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dibenzofuran	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Di-n-butyl phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	10	U	UJ	11.2	U	UJ	10	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	DIPHENYLAMINE	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Fluoranthene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Fluorene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Hexachloroethane	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Isophorone	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Methylphenol, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Methylphenol, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Naphthalene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitroaniline, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitrobenzene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	n-Nitrosodimethylamine	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Phenanthrene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Phenol	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Pyrene	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	10	U	U	11.2	U	U	10	U	U
Water Quality Parameters	Alkalinity	N	ppm	133			172					
Water Quality Parameters	Chloride	N	ppm	12.1			3.56					
Water Quality Parameters	Hardness	N	ppm	451			431					

Groundwater Analytical Summary

Location Code:				ASH PIT 1-PZ01			ASH PIT 1-PZ02			ASH PIT 1-PZ04		
Sample Number;				AP3000			AP3001			AP3003		
Sample Date:				12-Dec-08			11-Dec-08			15-Dec-08		
Sample Depth:				19 - 19 Ft			16 - 16 Ft			20 - 20 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Water Quality Parameters	Hardness	Y	ppm	464			363					
Water Quality Parameters	Nitrate-Nitrite	N	ppm	0.097			0.353					
Water Quality Parameters	Sulfate	N	ppm	61.7			39.4					
Water Quality Parameters	Total dissolved solids	N	ppm	484			384					
Water Quality Parameters	Total suspended solids	N	ppm	161			343					
Water Quality Parameters	Turbidity	N	NTU	111			195					

Location Code:				ASH PIT 1-PZ04			ASH PIT 1-PZ04			ASH PIT 1-PZ05		
Sample Number;				WW3005			WW3013			AP3004		
Sample Date:				15-Dec-08			15-Dec-08			15-Dec-08		
Sample Depth:				20 - 20 Ft			20 - 20 Ft			20 - 20 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	9.19						13.04		
Field Tests	FERROUS IRON	N	mg/L									
Field Tests	Oxidation Reduction Potential	N	mV	-92.3						83		
Field Tests	pH	N	pH_units	10.32						4.32		
Field Tests	Specific Conductivity	N	mS/cm	0.305						0.903		
Field Tests	Temperature	N	C	8.51						4.32		
Field Tests	Turbidity	N	NTU	1000						1000		
Cyanide	Cyanide, total	N	ppm							0.025	U	U
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.384	U	U	0.2	U	U	0.342	J	J
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	HMX	N	ug/L	0.384	U	U	0.5	U	U	0.373	U	U
Explosives	Nitrobenzene	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	RDX	N	ug/L	0.384	U	U	0.5	U	U	0.373	U	U
Explosives	Tetryl	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.384	U	U	0.2	U	U	0.373	U	U
Metals - Unfiltered	Aluminum	N	ug/L							2080		
Metals - Unfiltered	Antimony	N	ug/L							2.78	U	U
Metals - Unfiltered	Arsenic	N	ug/L							5.56	U	U
Metals - Unfiltered	Barium	N	ug/L							41.5		B
Metals - Unfiltered	Beryllium	N	ug/L							4.44	U	U
Metals - Unfiltered	Cadmium	N	ug/L							2.78	U	U
Metals - Unfiltered	Calcium	N	ug/L							159000		
Metals - Unfiltered	Chromium	N	ug/L							11.1	U	U
Metals - Unfiltered	Cobalt	N	ug/L							4.44	U	U
Metals - Unfiltered	Copper	N	ug/L							11.1	U	U
Metals - Unfiltered	Iron	N	ug/L							2580		
Metals - Unfiltered	Lead	N	ug/L							2.78	U	U
Metals - Unfiltered	Magnesium	N	ug/L							52700		
Metals - Unfiltered	Manganese	N	ug/L							3370		
Metals - Unfiltered	Mercury	N	ug/L							0.2	U	U
Metals - Unfiltered	Nickel	N	ug/L							6.67	U	U
Metals - Unfiltered	Potassium	N	ug/L							9130		
Metals - Unfiltered	Selenium	N	ug/L							5.56	U	U
Metals - Unfiltered	Silver	N	ug/L							11.1	U	U
Metals - Unfiltered	Sodium	N	ug/L							59400		B
Metals - Unfiltered	Thallium	N	ug/L							2.78	U	U
Metals - Unfiltered	Vanadium	N	ug/L							4.24	J	J
Metals - Unfiltered	Zinc	N	ug/L							55.6	U	U
Metals - Filtered	Aluminum	Y	ug/L							88.9	U	U
Metals - Filtered	Antimony	Y	ug/L							2.78	U	U
Metals - Filtered	Arsenic	Y	ug/L							5.56	U	U

Location Code:				ASH PIT 1-PZ04			ASH PIT 1-PZ04			ASH PIT 1-PZ05		
Sample Number;				WW3005			WW3013			AP3004		
Sample Date:				15-Dec-08			15-Dec-08			15-Dec-08		
Sample Depth:				20 - 20 Ft			20 - 20 Ft			20 - 20 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Metals - Filtered	Barium	Y	ug/L							32.2		B
Metals - Filtered	Beryllium	Y	ug/L							4.44	U	U
Metals - Filtered	Cadmium	Y	ug/L							2.78	U	U
Metals - Filtered	Calcium	Y	ug/L							175000		
Metals - Filtered	Chromium	Y	ug/L							11.1	U	U
Metals - Filtered	Cobalt	Y	ug/L							4.44	U	U
Metals - Filtered	Copper	Y	ug/L							22.2	U	U
Metals - Filtered	Iron	Y	ug/L							94.7		B
Metals - Filtered	Lead	Y	ug/L							2.78	U	U
Metals - Filtered	Magnesium	Y	ug/L							56600		
Metals - Filtered	Manganese	Y	ug/L							3540		
Metals - Filtered	Mercury	Y	ug/L							0.2	U	U
Metals - Filtered	Nickel	Y	ug/L							6.67	U	U
Metals - Filtered	Potassium	Y	ug/L							9270		
Metals - Filtered	Selenium	Y	ug/L							5.56	U	U
Metals - Filtered	Silver	Y	ug/L							11.1	U	U
Metals - Filtered	Sodium	Y	ug/L							62500		B
Metals - Filtered	Thallium	Y	ug/L							2.78	U	U
Metals - Filtered	Vanadium	Y	ug/L							4.44	U	U
Metals - Filtered	Zinc	Y	ug/L							55.6	U	U
Semivolatiles	Acenaphthene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Acenaphthylene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	ACETOPHENONE	N	ug/L				10	U	U			
Semivolatiles	Anthracene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Atrazine	N	ug/L				10	U	U			
Semivolatiles	Benzaldehyde	N	ug/L				10	U	U			
Semivolatiles	Benzo(a)anthracene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Benzoic acid	N	ug/L	10	U	UJ				10	U	UJ
Semivolatiles	Benzyl alcohol	N	ug/L	10	U	U				10	U	U
Semivolatiles	BIBENZENE	N	ug/L				10	U	U			
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Caprolactam	N	ug/L				10	U	U			
Semivolatiles	Carbazole	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	10	U	UJ	10	U	U	10	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Chrysene	N	ug/L	10	U	U	10	U	U	10	U	U

Location Code:				ASH PIT 1-PZ04			ASH PIT 1-PZ04			ASH PIT 1-PZ05		
Sample Number;				WW3005			WW3013			AP3004		
Sample Date:				15-Dec-08			15-Dec-08			15-Dec-08		
Sample Depth:				20 - 20 Ft			20 - 20 Ft			20 - 20 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dibenzofuran	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	10	U	U				10	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	10	U	U				10	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	10	U	U				10	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Di-n-butyl phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	DIPHENYLAMINE	N	ug/L	10	U	U				10	U	U
Semivolatiles	Fluoranthene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Fluorene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	10	U	U	10	U	UJ	10	U	U
Semivolatiles	Hexachloroethane	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Isophorone	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Methylphenol, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Methylphenol, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Naphthalene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitroaniline, 2-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	Nitrobenzene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	10	U	U	50	U	U	10	U	U
Semivolatiles	n-Nitrosodimethylamine	N	ug/L	10	U	U				10	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Phenanthrene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Phenol	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Pyrene	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	10	U	U				10	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	10	U	U	10	U	U	10	U	U
Water Quality Parameters	Alkalinity	N	ppm							246		
Water Quality Parameters	Chloride	N	ppm									
Water Quality Parameters	Hardness	N	ppm							614		

Groundwater Analytical Summary

Location Code:				ASH PIT 1-PZ04			ASH PIT 1-PZ04			ASH PIT 1-PZ05		
Sample Number;				WW3005			WW3013			AP3004		
Sample Date:				15-Dec-08			15-Dec-08			15-Dec-08		
Sample Depth:				20 - 20 Ft			20 - 20 Ft			20 - 20 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Water Quality Parameters	Hardness	Y	ppm							671		
Water Quality Parameters	Nitrate-Nitrite	N	ppm							0.035	J	J
Water Quality Parameters	Sulfate	N	ppm									
Water Quality Parameters	Total dissolved solids	N	ppm							1000		
Water Quality Parameters	Total suspended solids	N	ppm							66		
Water Quality Parameters	Turbidity	N	NTU							101		

Sediment Analyitcal Data Summary

Location Code:				AP1-SD01			AP1-SD02			AP1-SD03		
Sample Number;				AP1007			AP1008			AP1012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	HMX	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrobenzene	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	RDX	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Tetryl	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.17	U	U	0.19	U	U	0.19	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	9880			7130			4490		
Metals - Unfiltered	Antimony	N	mg/kg	0.5	B	J	0.7	B	J	4.5	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	7.6			9.3			4		
Metals - Unfiltered	Barium	N	mg/kg	57.5			35.7			31.3		
Metals - Unfiltered	Beryllium	N	mg/kg	0.62			0.5			0.3	B	J
Metals - Unfiltered	Cadmium	N	mg/kg	0.55			0.32			0.23	B	J
Metals - Unfiltered	Calcium	N	mg/kg	29900			10400			16800		
Metals - Unfiltered	Chromium	N	mg/kg	16.9			11.8			7.8		
Metals - Unfiltered	Cobalt	N	mg/kg	9.9			8.9			4.4		
Metals - Unfiltered	Copper	N	mg/kg	38.5			17.1			10.5		
Metals - Unfiltered	Iron	N	mg/kg	21700			19300			9270		
Metals - Unfiltered	Lead	N	mg/kg	23.7			13			7	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	9370			4360			4970		
Metals - Unfiltered	Manganese	N	mg/kg	446			337			165		
Metals - Unfiltered	Mercury	N	mg/kg	0.14			0.024	B	J	0.021	B	J
Metals - Unfiltered	Nickel	N	mg/kg	26.7			21.3			12		
Metals - Unfiltered	Potassium	N	mg/kg	1740			1170			725	B	J
Metals - Unfiltered	Selenium	N	mg/kg	0.32	B	J	0.38	B	J	7.5	U	U
Metals - Unfiltered	Silver	N	mg/kg	0.099	B	J	0.64	U	U	0.75	U	U
Metals - Unfiltered	Sodium	N	mg/kg	112	B	J	640	U	U	83.1	B	J
Metals - Unfiltered	Thallium	N	mg/kg	3.8	U	U	6.4	U	U	7.5	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	21.9			19.2			12.4		
Metals - Unfiltered	Zinc	N	mg/kg	98.9			45.3			33.3		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.027	U	U	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.027	U	U	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.027	U	U	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.027	U	U	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.027	U	U	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.025	J	J	0.022	U	U	0.026	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.0207	J	J	0.022	U	U	0.026	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Acenaphthene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Anthracene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U

Location Code:				AP1-SD01			AP1-SD02			AP1-SD03		
Sample Number;				AP1007			AP1008			AP1012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Benzo(a)anthracene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Benzoic acid	N	mg/kg	5.4	U	U	1.1	U	U	1.3	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Carbazole	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Chrysene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	2.2	U	U	0.18	J	J	0.52	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	5.4	U	U	1.1	U	U	1.3	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Fluoranthene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Fluorene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Isophorone	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Naphthalene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U

Location Code:				AP1-SD01			AP1-SD02			AP1-SD03		
Sample Number;				AP1007			AP1008			AP1012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Nitroaniline, 3-	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	2.2	U	U	0.43	U	U	0.52	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	5.4	U	U	1.1	U	U	1.3	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	5.4	U	U	1.1	U	U	1.3	U	U
Semivolatiles	Phenanthrene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Phenol	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Pyrene	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	1.1	U	U	0.22	U	U	0.26	U	U
Water Quality Parameters	% Solids	N	Percent	62.6			76.3			63.8		
Water Quality Parameters	Total organic carbon	N	mg/kg	21000								

Location Code:				AP1-SD04			AP3-SD01			AP3-SD02		
Sample Number;				AP1013			AP1009			AP1010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	HMX	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrobenzene	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	RDX	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Tetryl	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.18	U	U	0.16	U	U	0.18	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	9860			3610					
Metals - Unfiltered	Antimony	N	mg/kg	1.3	B	J	0.54	B	J			
Metals - Unfiltered	Arsenic	N	mg/kg	15.9			6.4					
Metals - Unfiltered	Barium	N	mg/kg	110			26.6					
Metals - Unfiltered	Beryllium	N	mg/kg	1.6			0.26	B	J			
Metals - Unfiltered	Cadmium	N	mg/kg	0.59			0.3	B	J			
Metals - Unfiltered	Calcium	N	mg/kg	13700			9610		J			
Metals - Unfiltered	Chromium	N	mg/kg	15.6			6.4					
Metals - Unfiltered	Cobalt	N	mg/kg	9.1			4.1	B	J			
Metals - Unfiltered	Copper	N	mg/kg	24.5			126					
Metals - Unfiltered	Iron	N	mg/kg	21400			13000		J			
Metals - Unfiltered	Lead	N	mg/kg	22.9			8.7	B	J			
Metals - Unfiltered	Magnesium	N	mg/kg	1810			4370		J			
Metals - Unfiltered	Manganese	N	mg/kg	1670			130		J			
Metals - Unfiltered	Mercury	N	mg/kg	0.11	B	J	0.027	B	J			
Metals - Unfiltered	Nickel	N	mg/kg	25.7			10.5		J			
Metals - Unfiltered	Potassium	N	mg/kg	1340			337	B	J			
Metals - Unfiltered	Selenium	N	mg/kg	1.3	B	J	0.54	B	B			
Metals - Unfiltered	Silver	N	mg/kg	1.2	U	U	0.9	U	U			
Metals - Unfiltered	Sodium	N	mg/kg	1200	U	U	900	U	U			
Metals - Unfiltered	Thallium	N	mg/kg	12	U	U	9	U	U			
Metals - Unfiltered	Vanadium	N	mg/kg	25.5			11.3					
Metals - Unfiltered	Zinc	N	mg/kg	137			52.8		J			
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.041	U	U	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.041	U	U	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.041	U	U	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.041	U	U	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.041	U	U	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.0352	J	J	0.031	U	U	0.03	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.113	J	J	0.031	U	U	0.03	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Acenaphthene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Acenaphthylene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Anthracene	N	mg/kg	0.42	U	U	0.31	U	U			

Location Code:				AP1-SD04			AP3-SD01			AP3-SD02		
Sample Number;				AP1013			AP1009			AP1010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.121	J	J	0.143	J	J			
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.112	J	J	0.158	J	J			
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.175	J	J	0.24	J	J			
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.42	U	U	0.101	J	J			
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.42	U	U	0.0805	J	J			
Semivolatiles	Benzoic acid	N	mg/kg	2.1	U	U	1.5	U	U			
Semivolatiles	Benzyl alcohol	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Carbazole	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Chrysene	N	mg/kg	0.149	J	J	0.159	J	J			
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Dibenzofuran	N	mg/kg	0.15	J	J	0.31	U	U			
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Diethyl phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	2.1	U	U	1.5	U	UJ			
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Fluoranthene	N	mg/kg	0.191	J	J	0.253	J	J			
Semivolatiles	Fluorene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Hexachloroethane	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.42	U	U	0.111	J	J			
Semivolatiles	Isophorone	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.616			0.31	U	U			
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Naphthalene	N	mg/kg	0.337	J	J	0.31	U	U			
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.84	U	U	0.61	U	U			

Location Code:				AP1-SD04			AP3-SD01			AP3-SD02		
Sample Number;				AP1013			AP1009			AP1010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - .5 Ft			0 - .5 Ft			0 - .5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.84	U	U	0.61	U	U			
Semivolatiles	Nitrobenzene	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Nitrophenol, 4-	N	mg/kg	2.1	U	U	1.5	U	U			
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Pentachlorophenol	N	mg/kg	2.1	U	U	1.5	U	U			
Semivolatiles	Phenanthrene	N	mg/kg	0.306	J	J	0.31	U	U			
Semivolatiles	Phenol	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Pyrene	N	mg/kg	0.195	J	J	0.206	J	J			
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.42	U	U	0.31	U	U			
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.42	U	U	0.31	U	U			
Water Quality Parameters	% Solids	N	Percent	40.1			54.3			55.4		
Water Quality Parameters	Total organic carbon	N	mg/kg	43000			28000					

Location Code:				AP3-SD03		
Sample Number;				AP1011		
Sample Date:				23-May-09		
Sample Depth:				0 - .5 Ft		
Sample Purpose:				REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.18	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.18	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.18	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.18	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.18	U	U
Explosives	HMX	N	mg/kg	0.18	U	U
Explosives	Nitrobenzene	N	mg/kg	0.18	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.18	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.18	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.18	U	U
Explosives	RDX	N	mg/kg	0.18	U	U
Explosives	Tetryl	N	mg/kg	0.18	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.18	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.18	U	U
Metals - Unfiltered	Aluminum	N	mg/kg			
Metals - Unfiltered	Antimony	N	mg/kg			
Metals - Unfiltered	Arsenic	N	mg/kg			
Metals - Unfiltered	Barium	N	mg/kg			
Metals - Unfiltered	Beryllium	N	mg/kg			
Metals - Unfiltered	Cadmium	N	mg/kg			
Metals - Unfiltered	Calcium	N	mg/kg			
Metals - Unfiltered	Chromium	N	mg/kg			
Metals - Unfiltered	Cobalt	N	mg/kg			
Metals - Unfiltered	Copper	N	mg/kg			
Metals - Unfiltered	Iron	N	mg/kg			
Metals - Unfiltered	Lead	N	mg/kg			
Metals - Unfiltered	Magnesium	N	mg/kg			
Metals - Unfiltered	Manganese	N	mg/kg			
Metals - Unfiltered	Mercury	N	mg/kg			
Metals - Unfiltered	Nickel	N	mg/kg			
Metals - Unfiltered	Potassium	N	mg/kg			
Metals - Unfiltered	Selenium	N	mg/kg			
Metals - Unfiltered	Silver	N	mg/kg			
Metals - Unfiltered	Sodium	N	mg/kg			
Metals - Unfiltered	Thallium	N	mg/kg			
Metals - Unfiltered	Vanadium	N	mg/kg			
Metals - Unfiltered	Zinc	N	mg/kg			
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.024	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.024	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg			
Semivolatiles	Acenaphthene	N	mg/kg			
Semivolatiles	Acenaphthylene	N	mg/kg			
Semivolatiles	Anthracene	N	mg/kg			

Location Code:				AP3-SD03		
Sample Number;				AP1011		
Sample Date:				23-May-09		
Sample Depth:				0 - .5 Ft		
Sample Purpose:				REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Semivolatiles	Benzo(a)anthracene	N	mg/kg			
Semivolatiles	Benzo(a)pyrene	N	mg/kg			
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg			
Semivolatiles	Benzo(ghi)perylene	N	mg/kg			
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg			
Semivolatiles	Benzoic acid	N	mg/kg			
Semivolatiles	Benzyl alcohol	N	mg/kg			
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg			
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg			
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg			
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg			
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg			
Semivolatiles	Butyl benzyl phthalate	N	mg/kg			
Semivolatiles	Carbazole	N	mg/kg			
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg			
Semivolatiles	Chloroaniline, 4-	N	mg/kg			
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg			
Semivolatiles	Chlorophenol, 2-	N	mg/kg			
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg			
Semivolatiles	Chrysene	N	mg/kg			
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg			
Semivolatiles	Dibenzofuran	N	mg/kg			
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg			
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg			
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg			
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg			
Semivolatiles	Diethyl phthalate	N	mg/kg			
Semivolatiles	Dimethyl phthalate	N	mg/kg			
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg			
Semivolatiles	Di-n-butyl phthalate	N	mg/kg			
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg			
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg			
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg			
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg			
Semivolatiles	Di-n-octyl phthalate	N	mg/kg			
Semivolatiles	Fluoranthene	N	mg/kg			
Semivolatiles	Fluorene	N	mg/kg			
Semivolatiles	Hexachlorobenzene	N	mg/kg			
Semivolatiles	Hexachlorobutadiene	N	mg/kg			
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg			
Semivolatiles	Hexachloroethane	N	mg/kg			
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg			
Semivolatiles	Isophorone	N	mg/kg			
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg			
Semivolatiles	Methylphenol, 2-	N	mg/kg			
Semivolatiles	Naphthalene	N	mg/kg			
Semivolatiles	Nitroaniline, 2-	N	mg/kg			

Location Code:					AP3-SD03	
Sample Number;					AP1011	
Sample Date:					23-May-09	
Sample Depth:					0 - .5 Ft	
Sample Purpose:					REG	
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Semivolatiles	Nitroaniline, 3-	N	mg/kg			
Semivolatiles	Nitroaniline, 4-	N	mg/kg			
Semivolatiles	Nitrobenzene	N	mg/kg			
Semivolatiles	Nitrophenol, 2-	N	mg/kg			
Semivolatiles	Nitrophenol, 4-	N	mg/kg			
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg			
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg			
Semivolatiles	Pentachlorophenol	N	mg/kg			
Semivolatiles	Phenanthrene	N	mg/kg			
Semivolatiles	Phenol	N	mg/kg			
Semivolatiles	Pyrene	N	mg/kg			
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg			
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg			
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg			
Water Quality Parameters	% Solids	N	Percent	68.4		
Water Quality Parameters	Total organic carbon	N	mg/kg			

Soil Analytical Data Summary

Location Code:				ASH PIT 1-SB01			ASH PIT 1-SB01			ASH PIT 1-SB01		
Sample Number;				AP0001			AP0002			AP0003		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				.5 - 1.5 Ft			3.5 - 5.5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	HMX	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	RDX	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Tetryl	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.316	U	UJ	0.29	U	U	0.314	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	6190		J	9230		J	8980		J
Metals - Unfiltered	Antimony	N	mg/kg	0.46	U	UJ	0.258	J	J	0.415	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	6.7		J	8.3		J	4.54		J
Metals - Unfiltered	Barium	N	mg/kg	32.7		J	37.7		J	51.5		J
Metals - Unfiltered	Beryllium	N	mg/kg	5.74		J	4.87		J	5.82		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.46	U	U	0.514	U	U	0.415	U	U
Metals - Unfiltered	Calcium	N	mg/kg	14400			35200			50900		
Metals - Unfiltered	Chromium	N	mg/kg	10.6			13.9			13.4		
Metals - Unfiltered	Cobalt	N	mg/kg	5.47			6.18			9.22		
Metals - Unfiltered	Copper	N	mg/kg	15.4		J	25.4		J	27.6		J
Metals - Unfiltered	Iron	N	mg/kg	17200	B		15600	B		20200	B	
Metals - Unfiltered	Lead	N	mg/kg	6.61			12.3			10.9		
Metals - Unfiltered	Magnesium	N	mg/kg	5030			13700			18600		
Metals - Unfiltered	Manganese	N	mg/kg	263			251			524		
Metals - Unfiltered	Mercury	N	mg/kg	0.0246	U	U	0.0241	U	U	0.0162	J	J
Metals - Unfiltered	Nickel	N	mg/kg	3.93		J	13.3		J	16.9		J
Metals - Unfiltered	Potassium	N	mg/kg	577		J	1130		J	1270		J
Metals - Unfiltered	Selenium	N	mg/kg	0.919	U	UJ	1.03	U	UJ	0.831	U	UJ
Metals - Unfiltered	Silver	N	mg/kg	0.496	U	U	0.413	U	U	0.476	U	U
Metals - Unfiltered	Sodium	N	mg/kg	57.6			96			151		
Metals - Unfiltered	Thallium	N	mg/kg	0.46	U	U	0.366	J	J	0.271	J	J
Metals - Unfiltered	Vanadium	N	mg/kg	20.7		J	19.3		J	20.9		J
Metals - Unfiltered	Zinc	N	mg/kg	44.4			57.1			58.7		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.202	U	U	0.201	U	U			
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.202	U	U	0.201	U	U			
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Soil Analytical Data Summary

Location Code:				ASH PIT 1-SB01			ASH PIT 1-SB01			ASH PIT 1-SB01		
Sample Number;				AP0001			AP0002			AP0003		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				.5 - 1.5 Ft			3.5 - 5.5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	UJ
Semivolatiles	Benzyl alcohol	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Chrysene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.0477	J	QJ	0.398	U	U	0.412	U	U
Semivolatiles	Fluorene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U

Location Code:				ASH PIT 1-SB01			ASH PIT 1-SB01			ASH PIT 1-SB01		
Sample Number;				AP0001			AP0002			AP0003		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				.5 - 1.5 Ft			3.5 - 5.5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Isophorone	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	UJ
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Phenol	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Pyrene	N	mg/kg	0.0378	J	QJ	0.398	U	U	0.412	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.41	U	U	0.398	U	U	0.412	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg	55.3	B	J						

Location Code:				ASH PIT 1-SB02			ASH PIT 1-SB02			ASH PIT 1-SB02		
Sample Number;				AP0004			AP0005			AP0006		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 3.8 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	HMX	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	RDX	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Tetryl	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.299	U	UJ	0.286	U	UJ	0.297	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	9360		J	8380		J	7780		J
Metals - Unfiltered	Antimony	N	mg/kg	0.595	U	UJ	0.294	J	J	0.463	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	9.14		J	6.17		J	4.3		J
Metals - Unfiltered	Barium	N	mg/kg	83.3		J	35.9		J	56.1		J
Metals - Unfiltered	Beryllium	N	mg/kg	10.8		J	5.99		J	5.23		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.595	U	U	0.345	J	J	0.463	U	U
Metals - Unfiltered	Calcium	N	mg/kg	18800			46600			45700		
Metals - Unfiltered	Chromium	N	mg/kg	12.4			11.9			11.5		
Metals - Unfiltered	Cobalt	N	mg/kg	8.57			9.76			8.14		
Metals - Unfiltered	Copper	N	mg/kg	27.3		J	37.7		J	24.4		J
Metals - Unfiltered	Iron	N	mg/kg	36500	B		21500	B		18000	B	
Metals - Unfiltered	Lead	N	mg/kg	9.65			14.6			11.4		
Metals - Unfiltered	Magnesium	N	mg/kg	5830			16500			20100		
Metals - Unfiltered	Manganese	N	mg/kg	306			543			472		
Metals - Unfiltered	Mercury	N	mg/kg	0.0357			0.0196	J	J	0.0159	J	J
Metals - Unfiltered	Nickel	N	mg/kg	0.346	U	U	18.7		J	15		J
Metals - Unfiltered	Potassium	N	mg/kg	1190		J	1110		J	1080		J
Metals - Unfiltered	Selenium	N	mg/kg	0.618	J	J	0.957	U	UJ	0.925	U	UJ
Metals - Unfiltered	Silver	N	mg/kg	0.576	U	U	0.431	U	U	0.456	U	U
Metals - Unfiltered	Sodium	N	mg/kg	114			131			137		
Metals - Unfiltered	Thallium	N	mg/kg	0.595	U	U	0.343	J	J	0.463	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	26.3		J	20.6		J	20.3		J
Metals - Unfiltered	Zinc	N	mg/kg	55.2			72.7			55.4		
Pesticides/PCBs	Aroclor 1016	N	mg/kg									
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.243	U	U						
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.243	U	U						
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.243	U	U						
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.243	U	U						
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.243	U	U						
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.243	U	U						
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB02			ASH PIT 1-SB02			ASH PIT 1-SB02		
Sample Number;				AP0004			AP0005			AP0006		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 3.8 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	UJ
Semivolatiles	Benzyl alcohol	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Chrysene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Fluorene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U

Location Code:				ASH PIT 1-SB02			ASH PIT 1-SB02			ASH PIT 1-SB02		
Sample Number;				AP0004			AP0005			AP0006		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 3.8 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Isophorone	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	UJ
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Phenol	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Pyrene	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.49	U	U	0.419	U	U	0.407	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB03			ASH PIT 1-SB03			ASH PIT 1-SB03		
Sample Number;				AP0007			AP0008			AP0009		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	HMX	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	RDX	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Tetryl	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.305	U	UJ	0.296	U	U	0.297	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	9940			2770			8470		
Metals - Unfiltered	Antimony	N	mg/kg	0.347	J	J	0.449	U	U	0.267	J	J
Metals - Unfiltered	Arsenic	N	mg/kg	13.2			5.62			6.7		
Metals - Unfiltered	Barium	N	mg/kg	107			13			46.7		
Metals - Unfiltered	Beryllium	N	mg/kg	13.9		J	3.62		J	5.49		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.526	U	U	0.449	U	U	0.277	J	J
Metals - Unfiltered	Calcium	N	mg/kg	9390			26700			48600		
Metals - Unfiltered	Chromium	N	mg/kg	13.6			5.51			11.7		
Metals - Unfiltered	Cobalt	N	mg/kg	9.92			3.23			8.43		
Metals - Unfiltered	Copper	N	mg/kg	30.5			7.71			27.3		
Metals - Unfiltered	Iron	N	mg/kg	63100			10600			18900		
Metals - Unfiltered	Lead	N	mg/kg	9.59			7.75			12.3		
Metals - Unfiltered	Magnesium	N	mg/kg	1500			6420			17100		
Metals - Unfiltered	Manganese	N	mg/kg	252			266			470		
Metals - Unfiltered	Mercury	N	mg/kg	0.0928			0.0232	U	U	0.0151	J	J
Metals - Unfiltered	Nickel	N	mg/kg	0.314	U	U	1.71			14.7		
Metals - Unfiltered	Potassium	N	mg/kg	1260			299			1070		
Metals - Unfiltered	Selenium	N	mg/kg	0.567	J	J	0.898	U	U	1.02	U	U
Metals - Unfiltered	Silver	N	mg/kg	0.523	U	U	0.49	U	U	0.446	U	U
Metals - Unfiltered	Sodium	N	mg/kg	96.8			61.3			132		
Metals - Unfiltered	Thallium	N	mg/kg	0.563			0.449	U	U	0.301	J	J
Metals - Unfiltered	Vanadium	N	mg/kg	29.9		J	15.1		J	20.5		J
Metals - Unfiltered	Zinc	N	mg/kg	57.1			23.1			54.1		
Pesticides/PCBs	Aroclor 1016	N	mg/kg				0.191	U	U			
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.243	U	U	0.191	U	U			
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.243	U	U	0.191	U	U			
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.243	U	U	0.191	U	U			
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.243	U	U	0.191	U	U			
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.243	U	U	0.191	U	U			
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.243	U	U	0.191	U	U			
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB03			ASH PIT 1-SB03			ASH PIT 1-SB03		
Sample Number;				AP0007			AP0008			AP0009		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Chrysene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Fluorene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	UJ
Semivolatiles	Hexachloroethane	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U

Location Code:				ASH PIT 1-SB03			ASH PIT 1-SB03			ASH PIT 1-SB03		
Sample Number;				AP0007			AP0008			AP0009		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Isophorone	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	UJ
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.485	U	UJ	0.386	U	UJ	0.401	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Phenol	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Pyrene	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.485	U	U	0.386	U	U	0.401	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB04		
Sample Number;				AP0010			AP0011			AP0012		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 4 Ft			3 - 4 Ft		
Sample Purpose:				REG			REG			FD		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	HMX	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Nitrobenzene	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	RDX	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Tetryl	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.274	U	UJ	0.324	U	U	0.306	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	12700			7340			6910		
Metals - Unfiltered	Antimony	N	mg/kg	0.352	J	J	0.439	U	U	0.407	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	11.7			3.72			3.42		
Metals - Unfiltered	Barium	N	mg/kg	105			52.8			132		
Metals - Unfiltered	Beryllium	N	mg/kg	16.5		J	6.43		J	8.18		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.531	U	U	0.25	J	J	0.313	J	J
Metals - Unfiltered	Calcium	N	mg/kg	3330			2570			2790		
Metals - Unfiltered	Chromium	N	mg/kg	12			11.7			11.5		
Metals - Unfiltered	Cobalt	N	mg/kg	8.92			26.8			28.9		
Metals - Unfiltered	Copper	N	mg/kg	50			9.5			11.3		
Metals - Unfiltered	Iron	N	mg/kg	90300			18700			27400		
Metals - Unfiltered	Lead	N	mg/kg	11.3			7.25			8.13		
Metals - Unfiltered	Magnesium	N	mg/kg	782			1150			1020		
Metals - Unfiltered	Manganese	N	mg/kg	241			871			1240		
Metals - Unfiltered	Mercury	N	mg/kg	0.383			0.0305			0.0301		
Metals - Unfiltered	Nickel	N	mg/kg	0.307	U	U	14.4			8.92		
Metals - Unfiltered	Potassium	N	mg/kg	1280			298			281		
Metals - Unfiltered	Selenium	N	mg/kg	0.6	J	J	0.878	U	U	0.813	U	U
Metals - Unfiltered	Silver	N	mg/kg	0.511	U	U	0.484	U	U	0.459	U	U
Metals - Unfiltered	Sodium	N	mg/kg	119			26			24		
Metals - Unfiltered	Thallium	N	mg/kg	0.356	J	J	0.439	U	U	0.407	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	32.4		J	22		J	26.1		J
Metals - Unfiltered	Zinc	N	mg/kg	55.3			63.4			75.1		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.229	U	U	0.0401	U	U	0.0399	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg				0.0401	U	U	0.0399	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB04		
Sample Number;				AP0010			AP0011			AP0012		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 4 Ft			3 - 4 Ft		
Sample Purpose:				REG			REG			FD		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.458	U	UJ	0.403	U	UJ	0.402	U	UJ
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.458	U	UJ	0.403	U	UJ	0.402	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Chrysene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.458	U	UJ	0.403	U	UJ	0.402	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Fluorene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB04		
Sample Number;				AP0010			AP0011			AP0012		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				0 - 1 Ft			3 - 4 Ft			3 - 4 Ft		
Sample Purpose:				REG			REG			FD		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Isophorone	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.0661	J	J	0.403	U	U	0.402	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.458	U	UJ	0.403	U	UJ	0.402	U	UJ
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.458	U	UJ	0.403	U	UJ	0.402	U	UJ
Semivolatiles	Nitrobenzene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.055	J	J	0.403	U	U	0.402	U	U
Semivolatiles	Phenol	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Pyrene	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.458	U	U	0.403	U	U	0.402	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB05		
Sample Number;				AP0013			AP0062			AP0014		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				8 - 10 Ft			3 - 4 Ft			0 - 1 Ft		
Sample Purpose:				REG			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	HMX	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	RDX	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	R
Explosives	Tetryl	N	mg/kg	0.316	U	U	0.3	U	U	0.319	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.316	U	U	0.2	U	U	0.319	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	10200			6680			10700		
Metals - Unfiltered	Antimony	N	mg/kg	0.304	J	J	7.4	U	U	0.416	J	J
Metals - Unfiltered	Arsenic	N	mg/kg	8.59			6.2			9.06		
Metals - Unfiltered	Barium	N	mg/kg	451			42.8			82.7		
Metals - Unfiltered	Beryllium	N	mg/kg	0.19		J	0.62	U	U	13.6		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.276	J	J	0.62	U	U	0.551	U	U
Metals - Unfiltered	Calcium	N	mg/kg	2300			2300			35100		
Metals - Unfiltered	Chromium	N	mg/kg	17.7			11			16.4		
Metals - Unfiltered	Cobalt	N	mg/kg	62.2			27.4			8.36		
Metals - Unfiltered	Copper	N	mg/kg	30.7			7.9			47.9		
Metals - Unfiltered	Iron	N	mg/kg	32800			21900			64800		
Metals - Unfiltered	Lead	N	mg/kg	19.2			6.8			12.3		
Metals - Unfiltered	Magnesium	N	mg/kg	3480			1140			4010		
Metals - Unfiltered	Manganese	N	mg/kg	4470			556			305		
Metals - Unfiltered	Mercury	N	mg/kg	0.0195	J	J	0.12	U	U	0.0756		
Metals - Unfiltered	Nickel	N	mg/kg	43.4			27.9			0.309	U	U
Metals - Unfiltered	Potassium	N	mg/kg	948			620	U	U	1160		
Metals - Unfiltered	Selenium	N	mg/kg	0.883	U	U	0.62	U	U	0.592	J	J
Metals - Unfiltered	Silver	N	mg/kg	0.474	U	U	1.2	U	U	0.516	U	U
Metals - Unfiltered	Sodium	N	mg/kg	45.9			620	U	U	165		
Metals - Unfiltered	Thallium	N	mg/kg	0.354	J	J	1.2	U	U	0.303	J	J
Metals - Unfiltered	Vanadium	N	mg/kg	29.3		J	20.5			27.9		J
Metals - Unfiltered	Zinc	N	mg/kg	87			60.7			62.8		
Pesticides/PCBs	Aroclor 1016	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg				0.041	U	U	0.237	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg				0.041	U	U	0.237	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg				0.083	U	U			

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB05		
Sample Number;				AP0013			AP0062			AP0014		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				8 - 10 Ft			3 - 4 Ft			0 - 1 Ft		
Sample Purpose:				REG			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Atrazine	N	mg/kg				0.41	U	U			
Semivolatiles	Benzaldehyde	N	mg/kg				0.41	U	U			
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.412	U	UJ				2.37	U	UJ
Semivolatiles	Benzyl alcohol	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	BIBENZENE	N	mg/kg				0.41	U	U			
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Caprolactam	N	mg/kg				0.41	U	U			
Semivolatiles	Carbazole	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.412	U	UJ	0.41	U	U	2.37	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Chrysene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.412	U	UJ	2	U	U	2.37	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.412	U	U	2	U	U	2.37	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.412	U	UJ	2	U	U	2.37	U	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Fluorene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.412	U	U	2	U	U	2.37	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U

Location Code:				ASH PIT 1-SB04			ASH PIT 1-SB04			ASH PIT 1-SB05		
Sample Number;				AP0013			AP0062			AP0014		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				8 - 10 Ft			3 - 4 Ft			0 - 1 Ft		
Sample Purpose:				REG			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Isophorone	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.412	U	U	0.41	U	U	0.942	J	J
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.412	U	U	0.41	U	U	0.764	J	J
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.412	U	U	2	U	U	2.37	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.412	U	UJ	2	U	U	2.37	U	UJ
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.412	U	U	2	U	U	2.37	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.412	U	U	2	U	U	2.37	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.412	U	UJ				2.37	U	UJ
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.412	U	U	0.41	U	U	0.275	J	J
Semivolatiles	Phenol	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Pyrene	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.412	U	U				2.37	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.412	U	U	0.41	U	U	2.37	U	U
Water Quality Parameters	% Solids	N	Percent				80.6					
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB05			ASH PIT 1-SB05			ASH PIT 1-SB06		
Sample Number;				AP0015			AP0016			AP0017		
Sample Date:				9-Dec-08			9-Dec-08			8-Dec-08		
Sample Depth:				3 - 3.7 Ft			8 - 9 Ft			.8 - 1.8 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	HMX	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	RDX	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Tetryl	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.284	U	U	0.317	U	U	0.284	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	6260			8810			10500		J
Metals - Unfiltered	Antimony	N	mg/kg	0.481	U	U	0.276	J	J	0.577	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	11.6			5.78			6.4		J
Metals - Unfiltered	Barium	N	mg/kg	168			45.5			62.6		J
Metals - Unfiltered	Beryllium	N	mg/kg	12.9		J	7		J	11.5		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.269	J	J	0.492	U	U	0.577	U	U
Metals - Unfiltered	Calcium	N	mg/kg	2960			36000			4580		
Metals - Unfiltered	Chromium	N	mg/kg	13.5			13.7			14.6		
Metals - Unfiltered	Cobalt	N	mg/kg	20.5			10.3			10.1		
Metals - Unfiltered	Copper	N	mg/kg	10.4			29.2			20.5		J
Metals - Unfiltered	Iron	N	mg/kg	62000			23600			41100	B	
Metals - Unfiltered	Lead	N	mg/kg	5.69			12			8.3		
Metals - Unfiltered	Magnesium	N	mg/kg	961			15600			1730		
Metals - Unfiltered	Manganese	N	mg/kg	954			484			199		
Metals - Unfiltered	Mercury	N	mg/kg	0.0592			0.0222	J	J	0.0146	J	J
Metals - Unfiltered	Nickel	N	mg/kg	0.293	U	U	16.1			0.34	U	U
Metals - Unfiltered	Potassium	N	mg/kg	164			1110			643		J
Metals - Unfiltered	Selenium	N	mg/kg	0.962	U	U	0.984	U	U	1.15	U	UJ
Metals - Unfiltered	Silver	N	mg/kg	0.489	U	U	0.47	U	U	0.567	U	U
Metals - Unfiltered	Sodium	N	mg/kg	34.9			107			70.4		
Metals - Unfiltered	Thallium	N	mg/kg	0.481	U	U	0.405	J	J	0.577	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	37.6		J	24.2		J	28.2		J
Metals - Unfiltered	Zinc	N	mg/kg	92.4			65.4			85.4		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.202	U	U						
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.202	U	U				0.228	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.202	U	U				0.228	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.202	U	U				0.228	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.202	U	U				0.228	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.202	U	U				0.228	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.202	U	U				0.228	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB05			ASH PIT 1-SB05			ASH PIT 1-SB06		
Sample Number;				AP0015			AP0016			AP0017		
Sample Date:				9-Dec-08			9-Dec-08			8-Dec-08		
Sample Depth:				3 - 3.7 Ft			8 - 9 Ft			.8 - 1.8 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.401	U	U	0.415	U	UJ	0.448	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.401	U	UJ	0.415	U	U	0.448	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.401	U	UJ	0.415	U	UJ	0.448	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Chrysene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.401	U	UJ	0.415	U	UJ	0.448	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.401	U	U	0.415	U	UJ	0.448	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Fluorene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U

Location Code:				ASH PIT 1-SB05			ASH PIT 1-SB05			ASH PIT 1-SB06		
Sample Number;				AP0015			AP0016			AP0017		
Sample Date:				9-Dec-08			9-Dec-08			8-Dec-08		
Sample Depth:				3 - 3.7 Ft			8 - 9 Ft			.8 - 1.8 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Isophorone	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.401	U	UJ	0.415	U	UJ	0.448	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.401	U	UJ	0.415	U	U	0.448	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.401	U	U	0.415	U	UJ	0.448	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Phenol	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Pyrene	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.401	U	U	0.415	U	U	0.448	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB06			ASH PIT 1-SB06			ASH PIT 1-SB08		
Sample Number;				AP0018			AP0019			AP0023		
Sample Date:				8-Dec-08			8-Dec-08			9-Dec-08		
Sample Depth:				5 - 5.8 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	HMX	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	RDX	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Tetryl	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.306	U	U	0.276	U	UJ	0.302	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	13000		J	8870		J	7200		
Metals - Unfiltered	Antimony	N	mg/kg	0.455	U	UJ	0.287	J	J	0.897		
Metals - Unfiltered	Arsenic	N	mg/kg	7.53		J	10.4		J	10.7		
Metals - Unfiltered	Barium	N	mg/kg	73.6		J	32.6		J	89.5		
Metals - Unfiltered	Beryllium	N	mg/kg	6.55		J	6.71		J	12		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.455	U	U	7.66			0.279	J	J
Metals - Unfiltered	Calcium	N	mg/kg	37800			39300			10800		
Metals - Unfiltered	Chromium	N	mg/kg	19.5			13.4			10.8		
Metals - Unfiltered	Cobalt	N	mg/kg	10.1			11.2			7.28		
Metals - Unfiltered	Copper	N	mg/kg	27		J	32.7		J	30.7		
Metals - Unfiltered	Iron	N	mg/kg	22600	B		23000	B		45900		
Metals - Unfiltered	Lead	N	mg/kg	12.2			13.1			28.8		
Metals - Unfiltered	Magnesium	N	mg/kg	11700			11600			1510		
Metals - Unfiltered	Manganese	N	mg/kg	701			373			343		
Metals - Unfiltered	Mercury	N	mg/kg	0.0236	U	U	0.0148	J	J	0.163		
Metals - Unfiltered	Nickel	N	mg/kg	23.7		J	21.2		J	0.308	U	U
Metals - Unfiltered	Potassium	N	mg/kg	1580		J	1260		J	678		
Metals - Unfiltered	Selenium	N	mg/kg	0.909	U	UJ	0.761	J	J	0.512	J	J
Metals - Unfiltered	Silver	N	mg/kg	0.451	U	U	0.472	U	U	0.513	U	U
Metals - Unfiltered	Sodium	N	mg/kg	117			118			65.3		J
Metals - Unfiltered	Thallium	N	mg/kg	0.239	J	J	0.663			0.292	J	J
Metals - Unfiltered	Vanadium	N	mg/kg	24.3		J	17		J	23.8		J
Metals - Unfiltered	Zinc	N	mg/kg	67.2			78			69.1		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.205	U	U				0.212	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.205	U	U				0.101	J	J
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.404	U	U	0.384	U	U	0.31	J	J
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB06			ASH PIT 1-SB06			ASH PIT 1-SB08		
Sample Number;				AP0018			AP0019			AP0023		
Sample Date:				8-Dec-08			8-Dec-08			9-Dec-08		
Sample Depth:				5 - 5.8 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.404	U	U	0.384	U	U	0.231	J	J
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.404	U	U	0.384	U	U	1.02	J	J
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.404	U	U	0.384	U	U	0.839	J	J
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.404	U	U	0.384	U	U	1.34	J	J
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.404	U	UJ	0.384	U	UJ	2.13	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	UJ
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	UJ
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Chrysene	N	mg/kg	0.404	U	U	0.384	U	U	0.989	J	J
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.404	U	UJ	0.384	U	UJ	2.13	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Fluoranthene	N	mg/kg	0.404	U	U	0.384	U	U	2.06	J	J
Semivolatiles	Fluorene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U

Location Code:				ASH PIT 1-SB06			ASH PIT 1-SB06			ASH PIT 1-SB08		
Sample Number;				AP0018			AP0019			AP0023		
Sample Date:				8-Dec-08			8-Dec-08			9-Dec-08		
Sample Depth:				5 - 5.8 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.404	U	U	0.384	U	U	1.95	J	J
Semivolatiles	Isophorone	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.404	U	U	0.384	U	U	0.299	J	J
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	UJ
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	UJ
Semivolatiles	Nitrobenzene	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.404	U	UJ	0.384	U	UJ	2.13	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.404	U	U	0.384	U	U	0.796	J	J
Semivolatiles	Phenol	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Pyrene	N	mg/kg	0.404	U	U	0.384	U	U	1.5	J	J
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.404	U	U	0.384	U	U	2.13	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB08			ASH PIT 1-SB08		
Sample Number;				AP0024			AP0025			AP0057		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				3 - 5 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	HMX	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Nitrobenzene	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	RDX	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Tetryl	N	mg/kg	0.323	U	UJ	0.3	U	U	0.3	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.323	U	UJ	0.3	U	U	0.2	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	6700		J	11700			9080		
Metals - Unfiltered	Antimony	N	mg/kg	0.348	J	J	0.26	J	J	7.8	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	9.98		J	5.65			12.6		
Metals - Unfiltered	Barium	N	mg/kg	109			42.3			76.5		
Metals - Unfiltered	Beryllium	N	mg/kg	11.5		J	7.18		J	0.65	U	U
Metals - Unfiltered	Cadmium	N	mg/kg	0.531	U	U	0.51	U	U	0.82		
Metals - Unfiltered	Calcium	N	mg/kg	5380		J	40400			9820		
Metals - Unfiltered	Chromium	N	mg/kg	8.34			17			11.6		
Metals - Unfiltered	Cobalt	N	mg/kg	5.37			10.1			6.7		
Metals - Unfiltered	Copper	N	mg/kg	21.3			28.4			30.7		
Metals - Unfiltered	Iron	N	mg/kg	47000			24400			44200		
Metals - Unfiltered	Lead	N	mg/kg	9.36			13.6			19.6		
Metals - Unfiltered	Magnesium	N	mg/kg	839			12100			1600		
Metals - Unfiltered	Manganese	N	mg/kg	469			347			254		
Metals - Unfiltered	Mercury	N	mg/kg	0.0516			0.0254	U	U	0.16		
Metals - Unfiltered	Nickel	N	mg/kg	0.291	U	U	18.8			16.8		
Metals - Unfiltered	Potassium	N	mg/kg	559			1370			875		
Metals - Unfiltered	Selenium	N	mg/kg	0.559	J	J	1.02	U	U	0.65	U	U
Metals - Unfiltered	Silver	N	mg/kg	0.484	U	UJ	0.482	U	U	1.3	U	U
Metals - Unfiltered	Sodium	N	mg/kg	87.4			98.5			646	U	U
Metals - Unfiltered	Thallium	N	mg/kg	0.275	J	J	0.333	J	J	1.3	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	18.9		J	25.3		J	18.4		
Metals - Unfiltered	Zinc	N	mg/kg	38.1			63.6			47.4		
Pesticides/PCBs	Aroclor 1016	N	mg/kg							0.043	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.238	U	U				0.043	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.238	U	U				0.043	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.238	U	U				0.043	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.238	U	U				0.043	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.238	U	U				0.043	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.238	U	U				0.043	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg							0.086	U	U

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB08			ASH PIT 1-SB08		
Sample Number;				AP0024			AP0025			AP0057		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				3 - 5 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Atrazine	N	mg/kg							0.43	U	U
Semivolatiles	Benzaldehyde	N	mg/kg							0.43	U	U
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.0642	J	J	0.412	U	U	0.58		
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.0534	J	J	0.412	U	U	0.55		
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.0829	J	J	0.412	U	U	0.77		
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.468	U	U	0.412	U	UJ			
Semivolatiles	Benzyl alcohol	N	mg/kg	0.468	U	UJ	0.412	U	U			
Semivolatiles	BIBENZENE	N	mg/kg							0.43	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Caprolactam	N	mg/kg							0.43	U	U
Semivolatiles	Carbazole	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.468	U	UJ	0.412	U	UJ	0.43	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Chrysene	N	mg/kg	0.0675	J	J	0.412	U	U	0.58		
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.468	U	UJ	0.412	U	UJ	2.1	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.468	U	U	0.412	U	U	2.1	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.468	U	U	0.412	U	UJ	2.1	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	Fluoranthene	N	mg/kg	0.126	J	J	0.412	U	U	1.3		
Semivolatiles	Fluorene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.468	U	U	0.412	U	U	2.1	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB08			ASH PIT 1-SB08		
Sample Number;				AP0024			AP0025			AP0057		
Sample Date:				9-Dec-08			9-Dec-08			9-Dec-08		
Sample Depth:				3 - 5 Ft			8 - 10 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.312	J	J	0.412	U	U	0.43	U	U
Semivolatiles	Isophorone	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.0553	J	J	0.412	U	U	0.43	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.468	U	U	0.412	U	U	2.1	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.468	U	UJ	0.412	U	UJ	2.1	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.468	U	UJ	0.412	U	U	2.1	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.468	U	U	0.412	U	U	2.1	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.468	U	U	0.412	U	UJ	0.43	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.075	J	J	0.412	U	U	0.51		
Semivolatiles	Phenol	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Pyrene	N	mg/kg	0.102	J	J	0.412	U	U	0.96		
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.468	U	U	0.412	U	U			
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.468	U	U	0.412	U	U	0.43	U	U
Water Quality Parameters	% Solids	N	Percent							77.3		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0063			AP0026			AP0027		
Sample Date:				9-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			0 - 1 Ft			3 - 4 Ft		
Sample Purpose:				FD			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	HMX	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Nitrobenzene	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Nitrotoluene, 2-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Nitrotoluene, 3-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Nitrotoluene, 4-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	RDX	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Tetryl	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.279	U	UJ	0.302	U	UJ	0.323	U	UJ
Metals - Unfiltered	Aluminum	N	mg/kg	7910			7650		J	7640		J
Metals - Unfiltered	Antimony	N	mg/kg	0.779			0.61	U	UJ	0.467	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	11.2			12.6		J	5.13		J
Metals - Unfiltered	Barium	N	mg/kg	79.3			84.9		J	39		J
Metals - Unfiltered	Beryllium	N	mg/kg	10.2		J	8.94		J	5.85		J
Metals - Unfiltered	Cadmium	N	mg/kg	0.483	U	U	0.61	U	U	0.467	U	U
Metals - Unfiltered	Calcium	N	mg/kg	14000			15600			46200		
Metals - Unfiltered	Chromium	N	mg/kg	15.2			10.7			11.7		
Metals - Unfiltered	Cobalt	N	mg/kg	6.15			6.2			8.95		
Metals - Unfiltered	Copper	N	mg/kg	33.1			18.2		J	26.6		J
Metals - Unfiltered	Iron	N	mg/kg	47100			26500	B		20600	B	
Metals - Unfiltered	Lead	N	mg/kg	25.3			6.28			9		
Metals - Unfiltered	Magnesium	N	mg/kg	2320			3740			16100		
Metals - Unfiltered	Manganese	N	mg/kg	341			2810			506		
Metals - Unfiltered	Mercury	N	mg/kg	0.151			0.0383			0.0124	J	J
Metals - Unfiltered	Nickel	N	mg/kg	0.263	U	U	0.363	U	U	13.5		J
Metals - Unfiltered	Potassium	N	mg/kg	630			1040		J	1010		J
Metals - Unfiltered	Selenium	N	mg/kg	0.965	U	U	1.22	U	UJ	0.933	U	UJ
Metals - Unfiltered	Silver	N	mg/kg	0.439	U	U	0.605	U	U	0.419	U	U
Metals - Unfiltered	Sodium	N	mg/kg	113		J	161			111		
Metals - Unfiltered	Thallium	N	mg/kg	0.256	J	J	0.61	U	U	0.467	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	19.9		J	20.7		J	19.1		J
Metals - Unfiltered	Zinc	N	mg/kg	57.7			34.8			63.3		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.208	U	U				0.2	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.208	U	U	0.269	U	U	0.2	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.208	U	U	0.269	U	U	0.2	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.208	U	U	0.269	U	U	0.2	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.208	U	U	0.269	U	U	0.2	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.208	U	U	0.269	U	U	0.2	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.208	U	U	0.269	U	U			
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.247	J	J	0.536	U	U	0.403	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0063			AP0026			AP0027		
Sample Date:				9-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			0 - 1 Ft			3 - 4 Ft		
Sample Purpose:				FD			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.2	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.691	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.603	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	1.07	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Benzoic acid	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	2.04	U	UJ	0.536	U	U	0.403	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	2.04	U	UJ	0.536	U	U	0.403	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Chrysene	N	mg/kg	0.711	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	2.04	U	U	0.0757	J	QJ	0.403	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	2.04	U	UJ	0.536	U	U	0.403	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Fluoranthene	N	mg/kg	1.69	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Fluorene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U

Location Code:				ASH PIT 1-SB08			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0063			AP0026			AP0027		
Sample Date:				9-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				0 - 1 Ft			0 - 1 Ft			3 - 4 Ft		
Sample Purpose:				FD			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	1.68	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Isophorone	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	2.04	U	U	0.363	J	QJ	0.403	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Naphthalene	N	mg/kg	2.04	U	U	0.247	J	J	0.403	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	2.04	U	UJ	0.536	U	U	0.403	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	2.04	U	UJ	0.536	U	U	0.403	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.866	J	J	0.156	J	J	0.403	U	U
Semivolatiles	Phenol	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Pyrene	N	mg/kg	1.14	J	J	0.536	U	U	0.403	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	2.04	U	U	0.536	U	U	0.403	U	U
Water Quality Parameters	% Solids	N	Percent									
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 1-SB09			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0028			AP0058			AP0061		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				8 - 10 Ft			8 - 10 Ft			8 - 10 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	HMX	N	mg/kg	0.28	U	U	0.279	U	UJ	0.2	U	U
Explosives	Nitrobenzene	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	RDX	N	mg/kg	0.28	U	U	0.279	U	UJ	0.2	U	U
Explosives	Tetryl	N	mg/kg	0.28	U	R	0.279	U	UJ	0.3	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.28	U	UJ	0.279	U	UJ	0.2	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	8650		J	8130		J	10700		
Metals - Unfiltered	Antimony	N	mg/kg	0.464	U	UJ	0.459	U	UJ	7.3	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	9.16		J	9.95		J	8.2		
Metals - Unfiltered	Barium	N	mg/kg	41.1		J	37.6		J	73.9		
Metals - Unfiltered	Beryllium	N	mg/kg	7.08		J	6.73		J	0.61	U	U
Metals - Unfiltered	Cadmium	N	mg/kg	0.464	U	U	0.459	U	U	0.61	U	U
Metals - Unfiltered	Calcium	N	mg/kg	37700			39800			50200		
Metals - Unfiltered	Chromium	N	mg/kg	13.5			12			17		
Metals - Unfiltered	Cobalt	N	mg/kg	10.7			10.3			10.8		
Metals - Unfiltered	Copper	N	mg/kg	30.1		J	31.4		J	23.1		
Metals - Unfiltered	Iron	N	mg/kg	24200	B		24200	B		24100		
Metals - Unfiltered	Lead	N	mg/kg	12.3			11.5			9.2		
Metals - Unfiltered	Magnesium	N	mg/kg	10300			10400			15000		
Metals - Unfiltered	Manganese	N	mg/kg	433			473			431		
Metals - Unfiltered	Mercury	N	mg/kg	0.0142	J	J	0.0146	J	J	0.12	U	U
Metals - Unfiltered	Nickel	N	mg/kg	17.1		J	17.2		J	27.8		
Metals - Unfiltered	Potassium	N	mg/kg	1270		J	1180		J	2440		
Metals - Unfiltered	Selenium	N	mg/kg	0.928	U	UJ	0.917	U	UJ	0.61	U	U
Metals - Unfiltered	Silver	N	mg/kg	0.468	U	U	0.437	U	U	1.2	U	U
Metals - Unfiltered	Sodium	N	mg/kg	149			156			605	U	U
Metals - Unfiltered	Thallium	N	mg/kg	0.349	J	J	0.446	J	J	1.2	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	16.4		J	16.6		J	19.6		
Metals - Unfiltered	Zinc	N	mg/kg	82.4			68.6			57.6		
Pesticides/PCBs	Aroclor 1016	N	mg/kg									
Pesticides/PCBs	Aroclor 1221	N	mg/kg									
Pesticides/PCBs	Aroclor 1232	N	mg/kg									
Pesticides/PCBs	Aroclor 1242	N	mg/kg									
Pesticides/PCBs	Aroclor 1248	N	mg/kg									
Pesticides/PCBs	Aroclor 1254	N	mg/kg									
Pesticides/PCBs	Aroclor 1260	N	mg/kg									
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg									
Semivolatiles	Acenaphthene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg							0.081	U	U

Location Code:				ASH PIT 1-SB09			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0028			AP0058			AP0061		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				8 - 10 Ft			8 - 10 Ft			8 - 10 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Atrazine	N	mg/kg							0.4	U	U
Semivolatiles	Benzaldehyde	N	mg/kg							0.4	U	U
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Benzoic acid	N	mg/kg	0.377	U	UJ	0.368	U	UJ			
Semivolatiles	Benzyl alcohol	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	BIBENZENE	N	mg/kg							0.4	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Caprolactam	N	mg/kg							0.4	U	U
Semivolatiles	Carbazole	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Chrysene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	0.377	U	UJ	0.368	U	UJ	1.9	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	Fluoranthene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Fluorene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U

Location Code:				ASH PIT 1-SB09			ASH PIT 1-SB09			ASH PIT 1-SB09		
Sample Number;				AP0028			AP0058			AP0061		
Sample Date:				8-Dec-08			8-Dec-08			8-Dec-08		
Sample Depth:				8 - 10 Ft			8 - 10 Ft			8 - 10 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Isophorone	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	0.377	U	U	0.368	U	U	1.9	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg	0.377	U	UJ	0.368	U	UJ			
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.0778	J	J	0.0887	J	J	0.4	U	U
Semivolatiles	Phenol	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Pyrene	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.377	U	U	0.368	U	U			
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.377	U	U	0.368	U	U	0.4	U	U
Water Quality Parameters	% Solids	N	Percent							82.6		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB01			ASH PIT 3-SB01			ASH PIT 3-SB02		
Sample Number;				AP0032			AP0033			AP0036		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.0563	J	J	0.15	U	U	0.16	U	U
Explosives	HMX	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Nitrobenzene	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	RDX	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Tetryl	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.18	U	U	0.15	U	U	0.16	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	5060		J	7010		J	7580		J
Metals - Unfiltered	Antimony	N	mg/kg	4.3	U	UJ	7.4	U	UJ	3.8	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	7.7			5			4.9		
Metals - Unfiltered	Barium	N	mg/kg	59			41.2			48.1		
Metals - Unfiltered	Beryllium	N	mg/kg	0.69			0.5			0.57		
Metals - Unfiltered	Cadmium	N	mg/kg	0.33			0.18	B	J	0.25	U	U
Metals - Unfiltered	Calcium	N	mg/kg	8460		J	49300		J	11700		J
Metals - Unfiltered	Chromium	N	mg/kg	8.8		J	10.3		J	11		J
Metals - Unfiltered	Cobalt	N	mg/kg	4.5		J	6.7		J	5.7		J
Metals - Unfiltered	Copper	N	mg/kg	124			18.4			11.6		
Metals - Unfiltered	Iron	N	mg/kg	12400		J	14500		J	13300		J
Metals - Unfiltered	Lead	N	mg/kg	16.5			9.3	B	J	9.7		
Metals - Unfiltered	Magnesium	N	mg/kg	2640		J	16600		J	5000		J
Metals - Unfiltered	Manganese	N	mg/kg	99.2		J	410		J	353		J
Metals - Unfiltered	Mercury	N	mg/kg	0.15			0.015	B	J	0.047	B	J
Metals - Unfiltered	Nickel	N	mg/kg	13			17.1			13.6		
Metals - Unfiltered	Potassium	N	mg/kg	524	B	J	1970		J	818		J
Metals - Unfiltered	Selenium	N	mg/kg	1.1	B	J	0.84	B	J	0.59	B	J
Metals - Unfiltered	Silver	N	mg/kg	0.72	U	UJ	0.62	U	UJ	0.63	U	J
Metals - Unfiltered	Sodium	N	mg/kg	238	B	J	293	B	J	196	B	J
Metals - Unfiltered	Thallium	N	mg/kg	2.9	U	U	0.62	U	U	0.63	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	14.1			16.3			19.3		
Metals - Unfiltered	Zinc	N	mg/kg	70.5		J	44.7		J	40.4		J
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.025	U	U	0.021	U	U	0.022	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.015	J	J	0.021	U	U	0.022	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.0516	J	J	0.2	U	U	0.21	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 3-SB01			ASH PIT 3-SB01			ASH PIT 3-SB02		
Sample Number;				AP0032			AP0033			AP0036		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.156	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.168	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.268			0.2	U	U	0.21	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.0882	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.0972	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Benzoic acid	N	mg/kg	1.2	U	U	1	U	U	1.1	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Chrysene	N	mg/kg	0.19	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1.2	U	U	1	U	U	1.1	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.401			0.2	U	U	0.21	U	U
Semivolatiles	Fluorene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U

Location Code:				ASH PIT 3-SB01			ASH PIT 3-SB01			ASH PIT 3-SB02		
Sample Number;				AP0032			AP0033			AP0036		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.0914	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Isophorone	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg									
Semivolatiles	Naphthalene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.49	U	U	0.41	U	U	0.43	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1.2	U	U	1	U	U	1.1	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1.2	U	U	1	U	U	1.1	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.107	J	J	0.2	U	U	0.21	U	U
Semivolatiles	Phenol	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Pyrene	N	mg/kg	0.273			0.2	U	U	0.21	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.25	U	U	0.2	U	U	0.21	U	U
Water Quality Parameters	% Solids	N	Percent	67.3			80.6			77.2		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB02			ASH PIT 3-SB03			ASH PIT 3-SB03		
Sample Number;				AP0037			AP0039			AP0040		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.0512	J	J	0.19	U	U	0.15	U	U
Explosives	HMX	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Nitrobenzene	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	RDX	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Tetryl	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.18	U	U	0.19	U	U	0.15	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	10400		J	8820		J	10400		J
Metals - Unfiltered	Antimony	N	mg/kg	8.1	U	UJ	7.6	U	UJ	7.7	U	UJ
Metals - Unfiltered	Arsenic	N	mg/kg	12.9			12.4			11.7		
Metals - Unfiltered	Barium	N	mg/kg	85.7			90.7			107		
Metals - Unfiltered	Beryllium	N	mg/kg	1.5			1.7			1.9		
Metals - Unfiltered	Cadmium	N	mg/kg	0.54	U	U	0.5	U	U	0.51	U	U
Metals - Unfiltered	Calcium	N	mg/kg	9690		J	11200		J	10400		J
Metals - Unfiltered	Chromium	N	mg/kg	14.9		J	14.3		J	15.4		J
Metals - Unfiltered	Cobalt	N	mg/kg	6.3	B	J	6.7		J	9.2		J
Metals - Unfiltered	Copper	N	mg/kg	16.2			14.2			21.4		
Metals - Unfiltered	Iron	N	mg/kg	24700		J	20100		J	20500		J
Metals - Unfiltered	Lead	N	mg/kg	3.4	B	J	3.9	B	J	7.3	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	891		J	1210		J	1170		J
Metals - Unfiltered	Manganese	N	mg/kg	120		J	148		J	188		J
Metals - Unfiltered	Mercury	N	mg/kg	0.22	U	U	0.036	B	J	0.044	B	J
Metals - Unfiltered	Nickel	N	mg/kg	13.4			15.1			23.7		
Metals - Unfiltered	Potassium	N	mg/kg	1570		J	1290	B	J	1150	B	J
Metals - Unfiltered	Selenium	N	mg/kg	2.2	B	J	1.9	B	J	2.7	B	J
Metals - Unfiltered	Silver	N	mg/kg	1.3	U	UJ	1.3	U	UJ	1.3	U	UJ
Metals - Unfiltered	Sodium	N	mg/kg	640	B	J	570	B	J	497	B	J
Metals - Unfiltered	Thallium	N	mg/kg	6.5	U	U	6.5	U	U	5.2	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	24.3			23.2			24		
Metals - Unfiltered	Zinc	N	mg/kg	30.5		J	15.9		J	52.6		J
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.047	U	U	0.043	U	U	0.044	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 3-SB02			ASH PIT 3-SB03			ASH PIT 3-SB03		
Sample Number;				AP0037			AP0039			AP0040		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Benzoic acid	N	mg/kg	2.3	U	U	2.1	U	U	2.2	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Chrysene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	UJ
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	2.3	U	U	2.1	U	U	2.2	U	UJ
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Fluorene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	UJ
Semivolatiles	Hexachloroethane	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U

Location Code:				ASH PIT 3-SB02			ASH PIT 3-SB03			ASH PIT 3-SB03		
Sample Number;				AP0037			AP0039			AP0040		
Sample Date:				19-Aug-09			19-Aug-09			19-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Isophorone	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg									
Semivolatiles	Naphthalene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.92	U	U	0.85	U	U	0.87	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	2.3	U	U	2.1	U	U	2.2	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	2.3	U	U	2.1	U	U	2.2	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Phenol	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Pyrene	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.46	U	U	0.43	U	U	0.43	U	U
Water Quality Parameters	% Solids	N	Percent	36.4			38.9			38.4		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB04			ASH PIT 3-SB04			ASH PIT 3-SB05		
Sample Number;				AP0042			AP0043			AP0045		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.17	U	U	0.16	U	U	0.0562	J	J
Explosives	HMX	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrobenzene	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	RDX	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Tetryl	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.17	U	U	0.16	U	U	0.18	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	8240			4870			9350		
Metals - Unfiltered	Antimony	N	mg/kg	8.8	U	U	7	U	U	7.8	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	29			8.5			13.7		
Metals - Unfiltered	Barium	N	mg/kg	127			41.5			82.2		
Metals - Unfiltered	Beryllium	N	mg/kg	2.1			0.4			1.5		
Metals - Unfiltered	Cadmium	N	mg/kg	0.3	B	J	0.2	B	J	0.52	U	U
Metals - Unfiltered	Calcium	N	mg/kg	15900			47500			12800		
Metals - Unfiltered	Chromium	N	mg/kg	15.5			7.7			13.6		
Metals - Unfiltered	Cobalt	N	mg/kg	8.9			5.9			7.4		
Metals - Unfiltered	Copper	N	mg/kg	43.6			15			19.3		
Metals - Unfiltered	Iron	N	mg/kg	24000			11200			22800		
Metals - Unfiltered	Lead	N	mg/kg	20.4			8.1	B	J	12.5	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	2300			14900			1120		
Metals - Unfiltered	Manganese	N	mg/kg	322			362			339		
Metals - Unfiltered	Mercury	N	mg/kg	0.13	B	J	0.014	B	J	0.22	U	U
Metals - Unfiltered	Nickel	N	mg/kg	22.9			14.3			17.2		
Metals - Unfiltered	Potassium	N	mg/kg	1060	B	J	1290			1110	B	J
Metals - Unfiltered	Selenium	N	mg/kg	2.9	B	J	1.1	B	J	1.7	B	J
Metals - Unfiltered	Silver	N	mg/kg	1.5	U	U	0.58	U	U	1.3	U	U
Metals - Unfiltered	Sodium	N	mg/kg	510	B	J	224	B	J	531	B	J
Metals - Unfiltered	Thallium	N	mg/kg	6	U	U	0.58	U	U	5.2	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	28.4			13.3			23.7		
Metals - Unfiltered	Zinc	N	mg/kg	68.3			37			66.3		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.05	U	U	0.021	U	U	0.044	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.043	J	J	0.021	U	U	0.044	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 3-SB04			ASH PIT 3-SB04			ASH PIT 3-SB05		
Sample Number;				AP0042			AP0043			AP0045		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Benzoic acid	N	mg/kg	2.5	U	U	1	U	U	2.2	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Chrysene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	2.5	U	U	1	U	U	2.2	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Fluorene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U

Location Code:				ASH PIT 3-SB04			ASH PIT 3-SB04			ASH PIT 3-SB05		
Sample Number;				AP0042			AP0043			AP0045		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				0 - 1 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Isophorone	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg									
Semivolatiles	Naphthalene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.99	U	U	0.41	U	U	0.87	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	2.5	U	U	1	U	U	2.2	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	2.5	U	U	1	U	U	2.2	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Phenol	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Pyrene	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.49	U	U	0.2	U	U	0.43	U	U
Water Quality Parameters	% Solids	N	Percent	33.6			81.5			37.9		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB05			ASH PIT 3-SB06			ASH PIT 3-SB06		
Sample Number;				AP0046			AP0048			AP0049		
Sample Date:				21-Aug-09			20-Aug-09			20-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	HMX	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Nitrobenzene	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	RDX	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Tetryl	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.18	U	U	0.16	U	U	0.15	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	6010			8770			11400		
Metals - Unfiltered	Antimony	N	mg/kg	0.67	B	J	1.2	B	J	1.3	B	J
Metals - Unfiltered	Arsenic	N	mg/kg	20.3			12.7			16.7		
Metals - Unfiltered	Barium	N	mg/kg	63.7			203			113		
Metals - Unfiltered	Beryllium	N	mg/kg	0.47			0.74			0.92		
Metals - Unfiltered	Cadmium	N	mg/kg	0.21	B	J	3.1	U	U	4	U	U
Metals - Unfiltered	Calcium	N	mg/kg	52800			2060			3200		
Metals - Unfiltered	Chromium	N	mg/kg	9.6			9.6			12		
Metals - Unfiltered	Cobalt	N	mg/kg	5.8			4.5			6.3		
Metals - Unfiltered	Copper	N	mg/kg	17.5			21.6			26.5		
Metals - Unfiltered	Iron	N	mg/kg	16700			68300			67800		
Metals - Unfiltered	Lead	N	mg/kg	9.6	B	J	4.5	B	J	7	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	17500			343	B	J	610		
Metals - Unfiltered	Manganese	N	mg/kg	432			54.5			81.7		
Metals - Unfiltered	Mercury	N	mg/kg	0.03	B	J	0.13	U	U	0.037	B	J
Metals - Unfiltered	Nickel	N	mg/kg	16.4			11.5			16		
Metals - Unfiltered	Potassium	N	mg/kg	1490			923			1380		
Metals - Unfiltered	Selenium	N	mg/kg	1.1	B	J	1.4	B	J	1.5	B	J
Metals - Unfiltered	Silver	N	mg/kg	0.62	U	U	0.78	U	U	0.99	U	U
Metals - Unfiltered	Sodium	N	mg/kg	261	B	J	493	B	J	634	B	J
Metals - Unfiltered	Thallium	N	mg/kg	2.5	U	U	3			2.9		
Metals - Unfiltered	Vanadium	N	mg/kg	15.5			15.1			19.5		
Metals - Unfiltered	Zinc	N	mg/kg	41.6			17.2			31.3		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.022	U	U	0.027	U	U	0.035	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 3-SB05			ASH PIT 3-SB06			ASH PIT 3-SB06		
Sample Number;				AP0046			AP0048			AP0049		
Sample Date:				21-Aug-09			20-Aug-09			20-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Benzoic acid	N	mg/kg	1	U	U	1.3	U	U	1.7	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Chrysene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1	U	U	1.3	U	U	1.7	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Fluorene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U

Location Code:				ASH PIT 3-SB05			ASH PIT 3-SB06			ASH PIT 3-SB06		
Sample Number:				AP0046			AP0048			AP0049		
Sample Date:				21-Aug-09			20-Aug-09			20-Aug-09		
Sample Depth:				3 - 5 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Isophorone	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg									
Semivolatiles	Naphthalene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.42	U	U	0.52	U	U	0.68	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1	U	U	1.3	U	U	1.7	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1	U	U	1.3	U	U	1.7	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Phenol	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Pyrene	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.21	U	U	0.26	U	U	0.34	U	U
Water Quality Parameters	% Solids	N	Percent	78.3			63.6			48.1		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB06			ASH PIT 3-SB07			ASH PIT 3-SB07		
Sample Number;				AP0061A			AP0051			AP0052		
Sample Date:				20-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				2 - 2.7 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	HMX	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Nitrobenzene	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	RDX	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Tetryl	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.16	U	U	0.19	U	U	0.17	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	7840			4760			9910		
Metals - Unfiltered	Antimony	N	mg/kg	0.93	B	J	5.5	U	U	0.72	B	J
Metals - Unfiltered	Arsenic	N	mg/kg	30.6			7.7			9.3		
Metals - Unfiltered	Barium	N	mg/kg	65.1			38.5			70.5		
Metals - Unfiltered	Beryllium	N	mg/kg	0.56			0.41	B	J	0.67		
Metals - Unfiltered	Cadmium	N	mg/kg	0.17	B	J	0.44			0.21	B	J
Metals - Unfiltered	Calcium	N	mg/kg	46100			14100			42400		
Metals - Unfiltered	Chromium	N	mg/kg	11.8			6.9			15		
Metals - Unfiltered	Cobalt	N	mg/kg	8.5			5			8.1		
Metals - Unfiltered	Copper	N	mg/kg	17.6			38.9			21.7		
Metals - Unfiltered	Iron	N	mg/kg	20500			15200			17700		
Metals - Unfiltered	Lead	N	mg/kg	10	B	J	12.2			11.9	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	15700			3130			15800		
Metals - Unfiltered	Manganese	N	mg/kg	402			217			477		
Metals - Unfiltered	Mercury	N	mg/kg	0.016	B	J	0.066	B	J	0.026	B	J
Metals - Unfiltered	Nickel	N	mg/kg	18.8			13.1			22.7		
Metals - Unfiltered	Potassium	N	mg/kg	1900			634	B	J	2110		
Metals - Unfiltered	Selenium	N	mg/kg	2.1	B	J	1.6	B	J	0.9	B	J
Metals - Unfiltered	Silver	N	mg/kg	0.61	U	U	0.92	U	U	0.63	U	U
Metals - Unfiltered	Sodium	N	mg/kg	300	B	J	168	B	J	269	B	J
Metals - Unfiltered	Thallium	N	mg/kg	0.61	U	U	0.92	U	U	0.63	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	17.7			10.7			21.9		
Metals - Unfiltered	Zinc	N	mg/kg	49.3			78.7			53.2		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.021	U	U	0.031	U	U	0.021	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg									

Location Code:				ASH PIT 3-SB06			ASH PIT 3-SB07			ASH PIT 3-SB07		
Sample Number;				AP0061A			AP0051			AP0052		
Sample Date:				20-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				2 - 2.7 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Atrazine	N	mg/kg									
Semivolatiles	Benzaldehyde	N	mg/kg									
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Benzoic acid	N	mg/kg	1	U	U	1.6	U	U	1.1	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	BIBENZENE	N	mg/kg									
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Caprolactam	N	mg/kg									
Semivolatiles	Carbazole	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Chrysene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1	U	U	1.6	U	U	1.1	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Fluorene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U

Location Code:				ASH PIT 3-SB06			ASH PIT 3-SB07			ASH PIT 3-SB07		
Sample Number;				AP0061A			AP0051			AP0052		
Sample Date:				20-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				2 - 2.7 Ft			0 - 1 Ft			3 - 5 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Isophorone	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg									
Semivolatiles	Naphthalene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.42	U	U	0.63	U	U	0.42	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1	U	U	1.6	U	U	1.1	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1	U	U	1.6	U	U	1.1	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Phenol	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Pyrene	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.21	U	U	0.31	U	U	0.21	U	U
Water Quality Parameters	% Solids	N	Percent	79.2			53.1			78.2		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB07			ASH PIT 3-SB07			ASH PIT 3-SB08		
Sample Number;				AP0059			AP0060			AP0054		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.15	U	U	0.25	U	U	0.0547	J	J
Explosives	HMX	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Nitrobenzene	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.15	U	U	0.5	U	U	0.16	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.15	U	U	0.4	U	U	0.16	U	U
Explosives	RDX	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Tetryl	N	mg/kg	0.15	U	U	0.5	U	U	0.16	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.15	U	U	0.25	U	U	0.16	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	9620			8630			7540		
Metals - Unfiltered	Antimony	N	mg/kg	7.6	U	U	7.7	U	U	7.6	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	6.9			7			27.3		
Metals - Unfiltered	Barium	N	mg/kg	70.1			77.2			83.5		
Metals - Unfiltered	Beryllium	N	mg/kg	0.63			0.64	U	U	1.6		
Metals - Unfiltered	Cadmium	N	mg/kg	0.19	B	J	0.64	U	U	0.51	U	U
Metals - Unfiltered	Calcium	N	mg/kg	47800			54300			17700		
Metals - Unfiltered	Chromium	N	mg/kg	14.5			14.8			14.3		
Metals - Unfiltered	Cobalt	N	mg/kg	7.3			8.4			7.6		
Metals - Unfiltered	Copper	N	mg/kg	19.4			15.4			20.5		
Metals - Unfiltered	Iron	N	mg/kg	14900			17500			28400		
Metals - Unfiltered	Lead	N	mg/kg	11.2	B	J	9.5			6.7	B	J
Metals - Unfiltered	Magnesium	N	mg/kg	17500			19400			1590		
Metals - Unfiltered	Manganese	N	mg/kg	460			498			280		
Metals - Unfiltered	Mercury	N	mg/kg	0.022	B	J	0.13	U	U	0.079	B	J
Metals - Unfiltered	Nickel	N	mg/kg	21.4			20.5			17.9		
Metals - Unfiltered	Potassium	N	mg/kg	2110			1770			948	B	J
Metals - Unfiltered	Selenium	N	mg/kg	0.98	B	J	0.64	U	U	2.2	B	J
Metals - Unfiltered	Silver	N	mg/kg	0.63	U	U	1.3	U	U	1.3	U	U
Metals - Unfiltered	Sodium	N	mg/kg	280	B	J	638	U	U	470	B	J
Metals - Unfiltered	Thallium	N	mg/kg	0.63	U	U	2.7			1.3	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	21.1			19.7			24.3		
Metals - Unfiltered	Zinc	N	mg/kg	49.5			59.3			27.2		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.021	U	U	0.042	U	U	0.045	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	Acenaphthene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg				0.085	U	U			

Location Code:				ASH PIT 3-SB07			ASH PIT 3-SB07			ASH PIT 3-SB08		
Sample Number;				AP0059			AP0060			AP0054		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Atrazine	N	mg/kg				0.42	U	U			
Semivolatiles	Benzaldehyde	N	mg/kg				0.42	U	U			
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Benzoic acid	N	mg/kg	1.1	U	U				2.2	U	U
Semivolatiles	Benzyl alcohol	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	BIBENZENE	N	mg/kg				0.42	U	U			
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	Caprolactam	N	mg/kg				0.42	U	U			
Semivolatiles	Carbazole	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Chrysene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.43	U	U	2	U	U	0.88	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.43	U	U	2	U	U	0.88	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1.1	U	U	2	U	U	2.2	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.43	U	U	0.42	U	U	0.88	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Fluorene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.22	U	U	2	U	U	0.44	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U

Location Code:				ASH PIT 3-SB07			ASH PIT 3-SB07			ASH PIT 3-SB08		
Sample Number;				AP0059			AP0060			AP0054		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			0 - 1 Ft		
Sample Purpose:				FD			FS			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Isophorone	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg				0.42	U	U			
Semivolatiles	Naphthalene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.43	U	U	2	U	U	0.88	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.43	U	U	2	U	U	0.88	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.43	U	U	2	U	U	0.88	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1.1	U	U	2	U	U	2.2	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1.1	U	U	0.42	U	UJ	2.2	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Phenol	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Pyrene	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.22	U	U				0.44	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.22	U	U	0.42	U	U	0.44	U	U
Water Quality Parameters	% Solids	N	Percent	76.5			78.3			37.6		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Location Code:				ASH PIT 3-SB08			ASH PIT 3-SB08			ASH PIT 3-SB08		
Sample Number;				AP0055			AP0056			AP0057A		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			3 - 5 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Dinitrobenzene, 1,3-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Dinitrotoluene, 2,4-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.14	U	U	0.0776	J	J	0.25	U	U
Explosives	HMX	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Nitrobenzene	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Nitrotoluene, 2-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Nitrotoluene, 3-	N	mg/kg	0.14	U	U	0.18	U	U	0.5	U	U
Explosives	Nitrotoluene, 4-	N	mg/kg	0.14	U	U	0.18	U	U	0.4	U	U
Explosives	RDX	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Tetryl	N	mg/kg	0.14	U	U	0.18	U	U	0.5	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	mg/kg	0.14	U	U	0.18	U	U	0.25	U	U
Metals - Unfiltered	Aluminum	N	mg/kg	8970			10400			9390		
Metals - Unfiltered	Antimony	N	mg/kg	0.5	B	J	0.88	B	J	16.7	U	U
Metals - Unfiltered	Arsenic	N	mg/kg	32.7			60.8			35.2		
Metals - Unfiltered	Barium	N	mg/kg	98.4			110			93.6		
Metals - Unfiltered	Beryllium	N	mg/kg	0.64			2			1.4	U	U
Metals - Unfiltered	Cadmium	N	mg/kg	0.14	B	J	3.3	U	U	1.4	U	U
Metals - Unfiltered	Calcium	N	mg/kg	28000			14900			14800		
Metals - Unfiltered	Chromium	N	mg/kg	12.6			18.8			17.5		
Metals - Unfiltered	Cobalt	N	mg/kg	12.2			8.1			13.9	U	U
Metals - Unfiltered	Copper	N	mg/kg	20.9			27.6			29.1		
Metals - Unfiltered	Iron	N	mg/kg	28300			50200			38300		
Metals - Unfiltered	Lead	N	mg/kg	8.6			9.8	B	J	12.2		
Metals - Unfiltered	Magnesium	N	mg/kg	12400			2110			1720		
Metals - Unfiltered	Manganese	N	mg/kg	1270			253			282		
Metals - Unfiltered	Mercury	N	mg/kg	0.029	B	J	0.071	B	J	0.28	U	U
Metals - Unfiltered	Nickel	N	mg/kg	31.9			20.7			28.5		
Metals - Unfiltered	Potassium	N	mg/kg	1400			1280	B	J	1390	U	U
Metals - Unfiltered	Selenium	N	mg/kg	0.66	B	J	3.3	B	J	2.5		
Metals - Unfiltered	Silver	N	mg/kg	0.59	U	U	1.6	U	U	2.8	U	U
Metals - Unfiltered	Sodium	N	mg/kg	324	B	J	658	B	J	1390	U	U
Metals - Unfiltered	Thallium	N	mg/kg	0.5	B	J	1.6	U	U	2.8	U	U
Metals - Unfiltered	Vanadium	N	mg/kg	20.3			33.5			27.4		
Metals - Unfiltered	Zinc	N	mg/kg	50.6			40.8			43.3		
Pesticides/PCBs	Aroclor 1016	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1221	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1232	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1242	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1248	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1254	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.021	U	U	0.054	U	U	0.092	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	Acenaphthene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Acenaphthylene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	ACETOPHENONE	N	mg/kg							0.19	U	U

Location Code:				ASH PIT 3-SB08			ASH PIT 3-SB08			ASH PIT 3-SB08		
Sample Number;				AP0055			AP0056			AP0057A		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			3 - 5 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Anthracene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Atrazine	N	mg/kg							0.92	U	U
Semivolatiles	Benzaldehyde	N	mg/kg							0.92	U	U
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Benzoic acid	N	mg/kg	1	U	U	2.8	U	U			
Semivolatiles	Benzyl alcohol	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	BIBENZENE	N	mg/kg							0.92	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Butyl benzyl phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	Caprolactam	N	mg/kg							0.92	U	U
Semivolatiles	Carbazole	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chloroaniline, 4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chloronaphthalene, 2-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chlorophenol, 2-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Chrysene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Dibenzofuran	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	Dichlorobenzene, 1,3-	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	Dichlorobenzene, 1,4-	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	mg/kg	0.42	U	U	1.1	U	U	4.5	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Diethyl phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	Dimethyl phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	mg/kg	0.42	U	U	1.1	U	U	4.5	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	mg/kg	1	U	U	2.8	U	U	4.5	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Di-n-octyl phthalate	N	mg/kg	0.42	U	U	1.1	U	U	0.92	U	U
Semivolatiles	DIPHENYLAMINE	N	mg/kg									
Semivolatiles	Fluoranthene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Fluorene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Hexachlorobenzene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Hexachlorobutadiene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	mg/kg	0.21	U	U	0.55	U	U	4.5	U	U
Semivolatiles	Hexachloroethane	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U

Location Code:				ASH PIT 3-SB08			ASH PIT 3-SB08			ASH PIT 3-SB08		
Sample Number;				AP0055			AP0056			AP0057A		
Sample Date:				21-Aug-09			21-Aug-09			21-Aug-09		
Sample Depth:				3 - 5 Ft			3 - 5 Ft			3 - 5 Ft		
Sample Purpose:				REG			FD			FS		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Isophorone	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Methylphenol, 2-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Methylphenol, 4-	N	mg/kg							0.92	U	U
Semivolatiles	Naphthalene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Nitroaniline, 2-	N	mg/kg	0.42	U	U	1.1	U	U	4.5	U	U
Semivolatiles	Nitroaniline, 3-	N	mg/kg	0.42	U	U	1.1	U	U	4.5	U	U
Semivolatiles	Nitroaniline, 4-	N	mg/kg	0.42	U	U	1.1	U	U	4.5	U	U
Semivolatiles	Nitrobenzene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Nitrophenol, 2-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Nitrophenol, 4-	N	mg/kg	1	U	U	2.8	U	U	4.5	U	U
Semivolatiles	n-Nitrosodimethylamine	N	mg/kg									
Semivolatiles	n-Nitroso-di-n-propylamine	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Pentachlorophenol	N	mg/kg	1	U	U	2.8	U	U	0.92	U	U
Semivolatiles	Phenanthrene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Phenol	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Pyrene	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	mg/kg	0.21	U	U	0.55	U	U			
Semivolatiles	Trichlorophenol, 2,4,5-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	mg/kg	0.21	U	U	0.55	U	U	0.92	U	U
Water Quality Parameters	% Solids	N	Percent	80.6			30.8			35.9		
Water Quality Parameters	Total organic carbon	N	mg/kg									

Surfacewater Analytical Data Summary

Location Code:				AP1-SW01			AP1-SW02			AP1-SW03		
Sample Number;				AP2007			AP2008			AP2012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	4.73			6.65			7.77		
Field Tests	Oxidation Reduction Potential	N	mV	32.5			51.9			175.7		
Field Tests	pH	N	pH_units	7.05			7.1			6.78		
Field Tests	Specific Conductivity	N	mS/cm	1.103			1.046			1.052		
Field Tests	Temperature	N	C	15.08			13.19			12.64		
Field Tests	Turbidity	N	NTU	9.4			0			1.3		
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	HMX	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrobenzene	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	RDX	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Tetryl	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.19	U	U	0.19	U	U	0.19	U	U
Metals - Unfiltered	Aluminum	N	ug/L	83.8	B	J	31.8	B	J	31.9	B	J
Metals - Unfiltered	Antimony	N	ug/L	6	U	U	6	U	U	6	U	U
Metals - Unfiltered	Arsenic	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Barium	N	ug/L	36.6	B	J	33.8	B	J	31.9	B	J
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U	4	U	U	4	U	U
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U	5	U	U	5	U	U
Metals - Unfiltered	Calcium	N	ug/L	145000			143000			139000		
Metals - Unfiltered	Chromium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Cobalt	N	ug/L	50	U	U	50	U	U	50	U	U
Metals - Unfiltered	Copper	N	ug/L	25	U	U	25	U	U	25	U	U
Metals - Unfiltered	Iron	N	ug/L	31.1	B	J	300	U	U	26.6	B	J
Metals - Unfiltered	Lead	N	ug/L	2.1	B	J	10	U	U	2	B	J
Metals - Unfiltered	Magnesium	N	ug/L	26200			26600			26300		
Metals - Unfiltered	Manganese	N	ug/L	488			396			247		
Metals - Unfiltered	Mercury	N	ug/L	1	U	U	1	U	U	1	U	U
Metals - Unfiltered	Nickel	N	ug/L	40	U	U	40	U	U	40	U	U
Metals - Unfiltered	Potassium	N	ug/L	2170	B	J	2040	B	J	2030	B	J
Metals - Unfiltered	Selenium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Silver	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Sodium	N	ug/L	6400	B	J	7050	B	J	6850	B	J
Metals - Unfiltered	Thallium	N	ug/L	10	U	U	10	U	U	10	U	U
Metals - Unfiltered	Vanadium	N	ug/L	50	U	U	50	U	U	50	U	U
Metals - Unfiltered	Zinc	N	ug/L	13.2	B	J	9.6	B	J	10.8	B	J
Pesticides/PCBs	Aroclor 1016	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Pesticides/PCBs	Aroclor 1221	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Pesticides/PCBs	Aroclor 1232	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Pesticides/PCBs	Aroclor 1242	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Pesticides/PCBs	Aroclor 1248	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U

Location Code:				AP1-SW01			AP1-SW02			AP1-SW03		
Sample Number;				AP2007			AP2008			AP2012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Pesticides/PCBs	Aroclor 1254	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Pesticides/PCBs	Aroclor 1260	N	ug/L	0.48	U	U	0.48	U	U	0.48	U	U
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Acenaphthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Acenaphthylene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(a)anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(a)pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(ghi)perylene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Benzoic acid	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Benzyl alcohol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Butyl benzyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Carbazole	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloroaniline, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chlorophenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Chrysene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dibenzofuran	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Diethyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dimethyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Di-n-butyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Di-n-octyl phthalate	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Fluoranthene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Fluorene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorobenzene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorobutadiene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Hexachloroethane	N	ug/L	5	U	U	5	U	U	5	U	U

Location Code:				AP1-SW01			AP1-SW02			AP1-SW03		
Sample Number;				AP2007			AP2008			AP2012		
Sample Date:				19-May-09			19-May-09			19-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Isophorone	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Methylphenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Naphthalene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitroaniline, 2-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitroaniline, 3-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitroaniline, 4-	N	ug/L	10	U	U	10	U	U	10	U	U
Semivolatiles	Nitrobenzene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitrophenol, 2-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Nitrophenol, 4-	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Pentachlorophenol	N	ug/L	25	U	U	25	U	U	25	U	U
Semivolatiles	Phenanthrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Phenol	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Pyrene	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	5	U	U	5	U	U	5	U	U
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	5	U	U	5	U	U	5	U	U

Location Code:				AP1-SW04			AP3-SW01			AP3-SW02		
Sample Number;				AP2013			AP2009			AP2010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm	7.2								
Field Tests	Oxidation Reduction Potential	N	mV	215.1								
Field Tests	pH	N	pH_units	7.12								
Field Tests	Specific Conductivity	N	mS/cm	1.295								
Field Tests	Temperature	N	C	12.43								
Field Tests	Turbidity	N	NTU	18								
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	HMX	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Nitrobenzene	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	RDX	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Tetryl	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.19	U	UJ	0.19	U	UJ	0.19	U	U
Metals - Unfiltered	Aluminum	N	ug/L	8770								
Metals - Unfiltered	Antimony	N	ug/L	6	U	U						
Metals - Unfiltered	Arsenic	N	ug/L	8.3	B	J						
Metals - Unfiltered	Barium	N	ug/L	80	B	J						
Metals - Unfiltered	Beryllium	N	ug/L	4	U	U						
Metals - Unfiltered	Cadmium	N	ug/L	5	U	U						
Metals - Unfiltered	Calcium	N	ug/L	222000								
Metals - Unfiltered	Chromium	N	ug/L	13.9								
Metals - Unfiltered	Cobalt	N	ug/L	6.9	B	J						
Metals - Unfiltered	Copper	N	ug/L	19.2	B	J						
Metals - Unfiltered	Iron	N	ug/L	15100								
Metals - Unfiltered	Lead	N	ug/L	15								
Metals - Unfiltered	Magnesium	N	ug/L	36900								
Metals - Unfiltered	Manganese	N	ug/L	836								
Metals - Unfiltered	Mercury	N	ug/L	1	U	U						
Metals - Unfiltered	Nickel	N	ug/L	26.2	B	J						
Metals - Unfiltered	Potassium	N	ug/L	11800								
Metals - Unfiltered	Selenium	N	ug/L	10	U	U						
Metals - Unfiltered	Silver	N	ug/L	10	U	U						
Metals - Unfiltered	Sodium	N	ug/L	9140	B	J						
Metals - Unfiltered	Thallium	N	ug/L	10	U	U						
Metals - Unfiltered	Vanadium	N	ug/L	20	B	J						
Metals - Unfiltered	Zinc	N	ug/L	93.2								
Pesticides/PCBs	Aroclor 1016	N	ug/L	0.48	U	U						
Pesticides/PCBs	Aroclor 1221	N	ug/L	0.48	U	U						
Pesticides/PCBs	Aroclor 1232	N	ug/L	0.48	U	U						
Pesticides/PCBs	Aroclor 1242	N	ug/L	0.48	U	U						
Pesticides/PCBs	Aroclor 1248	N	ug/L	0.48	U	U						

Location Code:				AP1-SW04			AP3-SW01			AP3-SW02		
Sample Number;				AP2013			AP2009			AP2010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Pesticides/PCBs	Aroclor 1254	N	ug/L	0.48	U	U						
Pesticides/PCBs	Aroclor 1260	N	ug/L	0.48	U	U						
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	5	U	U						
Semivolatiles	Acenaphthene	N	ug/L	5	U	U						
Semivolatiles	Acenaphthylene	N	ug/L	5	U	U						
Semivolatiles	Anthracene	N	ug/L	5	U	U						
Semivolatiles	Benzo(a)anthracene	N	ug/L	5	U	U						
Semivolatiles	Benzo(a)pyrene	N	ug/L	5	U	U						
Semivolatiles	Benzo(b)fluoranthene	N	ug/L	5	U	U						
Semivolatiles	Benzo(ghi)perylene	N	ug/L	5	U	U						
Semivolatiles	Benzo(k)fluoranthene	N	ug/L	5	U	U						
Semivolatiles	Benzoic acid	N	ug/L	25	U	U						
Semivolatiles	Benzyl alcohol	N	ug/L	5	U	U						
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L	5	U	U						
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L	5	U	U						
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L	5	U	U						
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L	5	U	U						
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L	5	U	U						
Semivolatiles	Butyl benzyl phthalate	N	ug/L	5	U	U						
Semivolatiles	Carbazole	N	ug/L	5	U	U						
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L	5	U	U						
Semivolatiles	Chloroaniline, 4-	N	ug/L	5	U	U						
Semivolatiles	Chloronaphthalene, 2-	N	ug/L	5	U	U						
Semivolatiles	Chlorophenol, 2-	N	ug/L	5	U	U						
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L	5	U	U						
Semivolatiles	Chrysene	N	ug/L	5	U	U						
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L	5	U	U						
Semivolatiles	Dibenzofuran	N	ug/L	5	U	U						
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L	5	U	U						
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L	5	U	U						
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L	5	U	U						
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L	10	U	U						
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L	5	U	U						
Semivolatiles	Diethyl phthalate	N	ug/L	5	U	U						
Semivolatiles	Dimethyl phthalate	N	ug/L	5	U	U						
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	5	U	U						
Semivolatiles	Di-n-butyl phthalate	N	ug/L	5	U	U						
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L	10	U	U						
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L	25	U	U						
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L	5	U	U						
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L	5	U	U						
Semivolatiles	Di-n-octyl phthalate	N	ug/L	5	U	U						
Semivolatiles	Fluoranthene	N	ug/L	5	U	U						
Semivolatiles	Fluorene	N	ug/L	5	U	U						
Semivolatiles	Hexachlorobenzene	N	ug/L	5	U	U						
Semivolatiles	Hexachlorobutadiene	N	ug/L	5	U	U						
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L	5	U	U						
Semivolatiles	Hexachloroethane	N	ug/L	5	U	U						

Location Code:				AP1-SW04			AP3-SW01			AP3-SW02		
Sample Number;				AP2013			AP2009			AP2010		
Sample Date:				20-May-09			23-May-09			23-May-09		
Sample Depth:				0 - 0 Ft			0 - 0 Ft			0 - 0 Ft		
Sample Purpose:				REG			REG			REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual	Result	Qual	ValQual	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L	5	U	U						
Semivolatiles	Isophorone	N	ug/L	5	U	U						
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	5	U	U						
Semivolatiles	Methylphenol, 2-	N	ug/L	5	U	U						
Semivolatiles	Naphthalene	N	ug/L	5	U	U						
Semivolatiles	Nitroaniline, 2-	N	ug/L	10	U	U						
Semivolatiles	Nitroaniline, 3-	N	ug/L	10	U	U						
Semivolatiles	Nitroaniline, 4-	N	ug/L	10	U	U						
Semivolatiles	Nitrobenzene	N	ug/L	5	U	U						
Semivolatiles	Nitrophenol, 2-	N	ug/L	5	U	U						
Semivolatiles	Nitrophenol, 4-	N	ug/L	25	U	U						
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L	5	U	U						
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L	5	U	U						
Semivolatiles	Pentachlorophenol	N	ug/L	25	U	U						
Semivolatiles	Phenanthrene	N	ug/L	5	U	U						
Semivolatiles	Phenol	N	ug/L	5	U	U						
Semivolatiles	Pyrene	N	ug/L	5	U	U						
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L	5	U	U						
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L	5	U	U						
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L	5	U	U						

Location Code:					AP3-SW03	
Sample Number;					AP2011A	
Sample Date:					27-May-09	
Sample Depth:					0 - 0 Ft	
Sample Purpose:					REG	
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Field Tests	Dissolved Oxygen	N	ppm			
Field Tests	Oxidation Reduction Potential	N	mV			
Field Tests	pH	N	pH_units			
Field Tests	Specific Conductivity	N	mS/cm			
Field Tests	Temperature	N	C			
Field Tests	Turbidity	N	NTU			
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	0.19	U	U
Explosives	Amino-4,6-dinitrotoluene, 2-	N	ug/L	0.19	U	U
Explosives	Dinitrobenzene, 1,3-	N	ug/L	0.19	U	U
Explosives	Dinitrotoluene, 2,4-	N	ug/L	0.19	U	U
Explosives	Dinitrotoluene, 2,6-	N	ug/L	0.19	U	U
Explosives	HMX	N	ug/L	0.19	U	U
Explosives	Nitrobenzene	N	ug/L	0.19	U	U
Explosives	Nitrotoluene, 2-	N	ug/L	0.19	U	U
Explosives	Nitrotoluene, 3-	N	ug/L	0.19	U	U
Explosives	Nitrotoluene, 4-	N	ug/L	0.19	U	U
Explosives	RDX	N	ug/L	0.19	U	U
Explosives	Tetryl	N	ug/L	0.19	U	U
Explosives	Trinitrobenzene, 1,3,5-	N	ug/L	0.19	U	U
Explosives	Trinitrotoluene, 2,4,6-	N	ug/L	0.19	U	U
Metals - Unfiltered	Aluminum	N	ug/L			
Metals - Unfiltered	Antimony	N	ug/L			
Metals - Unfiltered	Arsenic	N	ug/L			
Metals - Unfiltered	Barium	N	ug/L			
Metals - Unfiltered	Beryllium	N	ug/L			
Metals - Unfiltered	Cadmium	N	ug/L			
Metals - Unfiltered	Calcium	N	ug/L			
Metals - Unfiltered	Chromium	N	ug/L			
Metals - Unfiltered	Cobalt	N	ug/L			
Metals - Unfiltered	Copper	N	ug/L			
Metals - Unfiltered	Iron	N	ug/L			
Metals - Unfiltered	Lead	N	ug/L			
Metals - Unfiltered	Magnesium	N	ug/L			
Metals - Unfiltered	Manganese	N	ug/L			
Metals - Unfiltered	Mercury	N	ug/L			
Metals - Unfiltered	Nickel	N	ug/L			
Metals - Unfiltered	Potassium	N	ug/L			
Metals - Unfiltered	Selenium	N	ug/L			
Metals - Unfiltered	Silver	N	ug/L			
Metals - Unfiltered	Sodium	N	ug/L			
Metals - Unfiltered	Thallium	N	ug/L			
Metals - Unfiltered	Vanadium	N	ug/L			
Metals - Unfiltered	Zinc	N	ug/L			
Pesticides/PCBs	Aroclor 1016	N	ug/L			
Pesticides/PCBs	Aroclor 1221	N	ug/L			
Pesticides/PCBs	Aroclor 1232	N	ug/L			
Pesticides/PCBs	Aroclor 1242	N	ug/L			
Pesticides/PCBs	Aroclor 1248	N	ug/L			

Location Code:				AP3-SW03		
Sample Number:				AP2011A		
Sample Date:				27-May-09		
Sample Depth:				0 - 0 Ft		
Sample Purpose:				REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Pesticides/PCBs	Aroclor 1254	N	ug/L			
Pesticides/PCBs	Aroclor 1260	N	ug/L			
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L			
Semivolatiles	Acenaphthene	N	ug/L			
Semivolatiles	Acenaphthylene	N	ug/L			
Semivolatiles	Anthracene	N	ug/L			
Semivolatiles	Benzo(a)anthracene	N	ug/L			
Semivolatiles	Benzo(a)pyrene	N	ug/L			
Semivolatiles	Benzo(b)fluoranthene	N	ug/L			
Semivolatiles	Benzo(ghi)perylene	N	ug/L			
Semivolatiles	Benzo(k)fluoranthene	N	ug/L			
Semivolatiles	Benzoic acid	N	ug/L			
Semivolatiles	Benzyl alcohol	N	ug/L			
Semivolatiles	Bis(2-chloroethoxy)methane	N	ug/L			
Semivolatiles	Bis(2-chloroethyl)ether	N	ug/L			
Semivolatiles	Bis(2-chloroisopropyl)ether	N	ug/L			
Semivolatiles	Bis(2-ethylhexyl)phthalate	N	ug/L			
Semivolatiles	Bromophenyl phenyl ether, 4-	N	ug/L			
Semivolatiles	Butyl benzyl phthalate	N	ug/L			
Semivolatiles	Carbazole	N	ug/L			
Semivolatiles	Chloro-3-methylphenol, 4-	N	ug/L			
Semivolatiles	Chloroaniline, 4-	N	ug/L			
Semivolatiles	Chloronaphthalene, 2-	N	ug/L			
Semivolatiles	Chlorophenol, 2-	N	ug/L			
Semivolatiles	Chlorophenyl phenyl ether, 4-	N	ug/L			
Semivolatiles	Chrysene	N	ug/L			
Semivolatiles	Dibenz(a,h)anthracene	N	ug/L			
Semivolatiles	Dibenzofuran	N	ug/L			
Semivolatiles	Dichlorobenzene, 1,2-	N	ug/L			
Semivolatiles	Dichlorobenzene, 1,3-	N	ug/L			
Semivolatiles	Dichlorobenzene, 1,4-	N	ug/L			
Semivolatiles	Dichlorobenzidine, 3,3'-	N	ug/L			
Semivolatiles	Dichlorophenol, 2,4-	N	ug/L			
Semivolatiles	Diethyl phthalate	N	ug/L			
Semivolatiles	Dimethyl phthalate	N	ug/L			
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L			
Semivolatiles	Di-n-butyl phthalate	N	ug/L			
Semivolatiles	Dinitro-2-methylphenol, 4,6-	N	ug/L			
Semivolatiles	Dinitrophenol, 2,4-	N	ug/L			
Semivolatiles	Dinitrotoluene, 2,4-	N	ug/L			
Semivolatiles	Dinitrotoluene, 2,6-	N	ug/L			
Semivolatiles	Di-n-octyl phthalate	N	ug/L			
Semivolatiles	Fluoranthene	N	ug/L			
Semivolatiles	Fluorene	N	ug/L			
Semivolatiles	Hexachlorobenzene	N	ug/L			
Semivolatiles	Hexachlorobutadiene	N	ug/L			
Semivolatiles	Hexachlorocyclopentadiene	N	ug/L			
Semivolatiles	Hexachloroethane	N	ug/L			

Location Code:				AP3-SW03		
Sample Number;				AP2011A		
Sample Date:				27-May-09		
Sample Depth:				0 - 0 Ft		
Sample Purpose:				REG		
Test Group	Parameter	Filtered	Units	Result	Qual	ValQual
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	ug/L			
Semivolatiles	Isophorone	N	ug/L			
Semivolatiles	Methylnaphthalene, 2-	N	ug/L			
Semivolatiles	Methylphenol, 2-	N	ug/L			
Semivolatiles	Naphthalene	N	ug/L			
Semivolatiles	Nitroaniline, 2-	N	ug/L			
Semivolatiles	Nitroaniline, 3-	N	ug/L			
Semivolatiles	Nitroaniline, 4-	N	ug/L			
Semivolatiles	Nitrobenzene	N	ug/L			
Semivolatiles	Nitrophenol, 2-	N	ug/L			
Semivolatiles	Nitrophenol, 4-	N	ug/L			
Semivolatiles	n-Nitroso-di-n-propylamine	N	ug/L			
Semivolatiles	n-Nitrosodiphenylamine	N	ug/L			
Semivolatiles	Pentachlorophenol	N	ug/L			
Semivolatiles	Phenanthrene	N	ug/L			
Semivolatiles	Phenol	N	ug/L			
Semivolatiles	Pyrene	N	ug/L			
Semivolatiles	Trichlorobenzene, 1,2,4-	N	ug/L			
Semivolatiles	Trichlorophenol, 2,4,5-	N	ug/L			
Semivolatiles	Trichlorophenol, 2,4,6-	N	ug/L			

APPENDIX I

DETECTED HITS SUMMARY EXCLUDING “B” QUALIFIERS

Groundwater Detected Hits Summary

Location Code:							AP1-BEDGW-001		AP1-BEDGW-001		AP1-BEDGW-002	
Sample Number:							AP3053		AP3073		AP3054	
Sample Date:							9-May-09		6-Nov-09		10-May-09	
Sampel Depth:							0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 TAP-RSL	GW-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Acetone	N	ug/L	2,200	NE	463	140	J	463	J	-	-
Volatiles	Benzene	N	ug/L	0.41	2.4	1300	613		1,300		67.1	
Volatiles	Butanone, 2-	N	ug/L	710	NE	299	71.5		299		10.9	
Volatiles	Carbon disulfide	N	ug/L	100	NE	12.3	12.3	J	-	-	3	J
Volatiles	Chloroform	N	ug/L	0.19	NE	66.7	18		-	-	-	-
Volatiles	Chloromethane	N	ug/L	19	NE	216	-	-	-	-	-	-
Volatiles	Ethylbenzene	N	ug/L	1.5	0.87	176	126		176		45.6	
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	200	NE	3.3	-	-	-	-	-	-
Volatiles	Methylene chloride	N	ug/L	4.8	NE	77.6	11.2	B	28.8	J	3	B
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	0.067	NE	1.2	-	-	-	-	0.53	J
Volatiles	Toluene	N	ug/L	230	1.7	730	490		730		69.2	
Volatiles	Xylenes, total	N	ug/L	20	5.5	1340	1,060		1,340		473	
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	NE	NE	9	9	J	8	J	-	-
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	73	NE	24.7	24.7		20.7		2	J
Semivolatiles	Fluorene	N	ug/L	150	NE	5.4	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	15	NE	256	36.2		32.7		14.5	
Semivolatiles	Methylphenol, 2-	N	ug/L	180	NE	6.9	6.9	J	6.2	J	-	-
Semivolatiles	Naphthalene	N	ug/L	0.14	NE	64.9	33		33.2		11.8	
Semivolatiles	Phenanthrene	N	ug/L	NE	NE	37.3	-	-	-	-	-	-
Semivolatiles	Phenol	N	ug/L	1,100	NE	6.6	6.6	J	6.6	J	-	-
Metals - Unfiltered	Aluminum	N	ug/L	3,700	309	90.4	57.2	J	45.3	J	67.5	J
Metals - Unfiltered	Antimony	N	ug/L	1.5	NE	5.8	-	-	-	-	5.8	J
Metals - Unfiltered	Arsenic	N	ug/L	0.045	7.4	110	69.7		110		101	
Metals - Unfiltered	Barium	N	ug/L	730	11,800	989	897		989		555	
Metals - Unfiltered	Cadmium	N	ug/L	1.8	NE	1.4	-	-	-	-	-	-
Metals - Unfiltered	Calcium	N	ug/L	NE	316,000	590000	**573,000**		**590,000**		246,000	
Metals - Unfiltered	Copper	N	ug/L	150	19.8	0	-	-	-	-	-	-
Metals - Unfiltered	Iron	N	ug/L	2,600	1,550	4910	4,910		**1,570**		322	
Metals - Unfiltered	Lead	N	ug/L	15	NE	2.6	-	-	-	-	-	-
Metals - Unfiltered	Magnesium	N	ug/L	NE	217,000	479000	**418,000**		**479,000**		155,000	
Metals - Unfiltered	Manganese	N	ug/L	88	636	857	857		704		548	
Metals - Unfiltered	Nickel	N	ug/L	73	8.6	5.8	5.8	J	2.8	J	-	-
Metals - Unfiltered	Potassium	N	ug/L	NE	116,000	129000	110,000		**129,000**		59,600	
Metals - Unfiltered	Selenium	N	ug/L	18	NE	11.9	11.9	J	-	-	6.3	J
Metals - Unfiltered	Sodium	N	ug/L	NE	1,390,000	1470000	1,300,000		**1,470,000**		573,000	
Metals - Unfiltered	Thallium	N	ug/L	NE	NE	5.3	5.3	J	-	-	-	-
Metals - Unfiltered	Vanadium	N	ug/L	18	NE	2.8	2.2	J	-	-	2.6	J
Metals - Unfiltered	Zinc	N	ug/L	1,100	507	16	11.5	J	8	B	16	J
Metals - Filtered	Aluminum	Y	ug/L	3,700	309	409	23.2	J	26.1	J	**409**	
Metals - Filtered	Antimony	Y	ug/L	1.5	NE	5.4	-	-	-	-	5.4	J
Metals - Filtered	Arsenic	Y	ug/L	0.045	7.4	133	65.6		133		77.7	
Metals - Filtered	Barium	Y	ug/L	730	11,800	961	813		961		307	
Metals - Filtered	Cadmium	Y	ug/L	1.8	NE	0	-	-	-	-	-	-
Metals - Filtered	Calcium	Y	ug/L	NE	316,000	596000	**521,000**		**596,000**		153,000	
Metals - Filtered	Copper	Y	ug/L	150	19.8	43.1	-	-	-	-	**43.1**	
Metals - Filtered	Iron	Y	ug/L	2,600	1,550	124	-	-	77.4	J	124	J
Metals - Filtered	Lead	Y	ug/L	15	NE	7.5	-	-	-	-	7.5	J
Metals - Filtered	Magnesium	Y	ug/L	NE	217,000	471000	**427,000**		**471,000**		96,800	

Groundwater Detected Hits Summary

Location Code:							AP1-BEDGW-001		AP1-BEDGW-001		AP1-BEDGW-002	
Sample Number:							AP3053		AP3073		AP3054	
Sample Date:							9-May-09		6-Nov-09		10-May-09	
Sampel Depth:							0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 TAP-RSL	GW-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Manganese	Y	ug/L	88	636	804	**804**		**658**		379	
Metals - Filtered	Nickel	Y	ug/L	73	8.6	55.2	3.8	J	-	-	**55.2**	
Metals - Filtered	Potassium	Y	ug/L	NE	116,000	131000	107,000		**131,000**		45,300	
Metals - Filtered	Selenium	Y	ug/L	18	NE	16.7	16.7	J	-	-	15	J
Metals - Filtered	Sodium	Y	ug/L	NE	1,390,000	1410000	1,300,000		**1,410,000**		644,000	
Metals - Filtered	Thallium	Y	ug/L	NE	NE	0	-	-	-	-	-	-
Metals - Filtered	Vanadium	Y	ug/L	18	NE	3.1	2	J	-	-	3.1	J
Metals - Filtered	Zinc	Y	ug/L	1,100	507	140	8.3	J	-	-	140	
Water Quality Parameters	Alkalinity	N	ug/L	NE	NE	773000	386,000		453,000		678,000	
Water Quality Parameters	Chloride	N	ug/L	NE	NE	4280000	2,840,000		4,280,000		705,000	
Water Quality Parameters	Cyanide, total	N	ug/L	73	NE	120	37	J	-	-	120	J
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L	NE	NE	3450000	3,150,000		3,450,000		1,250,000	
Water Quality Parameters	Nitrate-Nitrite	N	ug/L	NE	NE	190	-	-	46	J	-	-
Water Quality Parameters	Sulfate	N	ug/L	NE	NE	93400	13,600		-	-	93,400	
Water Quality Parameters	Total dissolved solids	N	ug/L	NE	NE	9580000	9,580,000		7,680,000		3,130,000	
Water Quality Parameters	Total suspended solids	N	ug/L	NE	NE	250000	250,000		26,000		88,000	
Water Quality Parameters	Turbidity	N	NTU	NE	NE	296	35.1	J	296		6.3	J

Groundwater Detected Hits Summary

Location Code:				AP1-BEDGW-002		IT-MNTA-BEDGW-001		IT-MNTA-BEDGW-001	
Sample Number:				AP3074		LB3074		BEDGW-001-1109	
Sample Date:				10-Nov-09		19-May-09		6-Nov-09	
Sampel Depth:				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:				REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Volatiles	Acetone	N	ug/L	92.9	B	345	J	-	-
Volatiles	Benzene	N	ug/L	**27.5**		-	-	**3.7**	
Volatiles	Butanone, 2-	N	ug/L	-	-	81.3	J	-	-
Volatiles	Carbon disulfide	N	ug/L	1.9	J	11.6	J	3.8	
Volatiles	Chloroform	N	ug/L	12		66.7		-	-
Volatiles	Chloromethane	N	ug/L	216		-	-	-	-
Volatiles	Ethylbenzene	N	ug/L	**30.9**		**16.7**	J	**9.9**	
Volatiles	Methyl-2-pentanone, 4-	N	ug/L	-	-	-	-	3.3	J
Volatiles	Methylene chloride	N	ug/L	-	-	77.6	J	-	-
Volatiles	Tetrachloroethane, 1,1,2,2-	N	ug/L	-	-	-	-	1.2	
Volatiles	Toluene	N	ug/L	**43.6**		**14.2**	J	**10**	
Volatiles	Xylenes, total	N	ug/L	**370**		**235**		**136**	
Semivolatiles	3-Methylphenol and 4-Methylphenol	N	ug/L	0.97	J	-	-	-	-
Semivolatiles	Dimethylphenol, 2,4-	N	ug/L	2.8	J	-	-	-	-
Semivolatiles	Fluorene	N	ug/L	-	-	5.4	J	-	-
Semivolatiles	Methylnaphthalene, 2-	N	ug/L	14.5		71		256	J
Semivolatiles	Methylphenol, 2-	N	ug/L	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	ug/L	15.3		17.7	J	64.9	J
Semivolatiles	Phenanthrene	N	ug/L	-	-	12.7	J	37.3	J
Semivolatiles	Phenol	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	ug/L	46.7	J	90.4	B	79.6	J
Metals - Unfiltered	Antimony	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Arsenic	N	ug/L	**50.7**		-	-	-	-
Metals - Unfiltered	Barium	N	ug/L	434		343		305	
Metals - Unfiltered	Cadmium	N	ug/L	-	-	1.4	J	-	-
Metals - Unfiltered	Calcium	N	ug/L	220,000		314,000	J	280,000	
Metals - Unfiltered	Copper	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Iron	N	ug/L	335	J	591		180	J
Metals - Unfiltered	Lead	N	ug/L	-	-	2.6	J	-	-
Metals - Unfiltered	Magnesium	N	ug/L	155,000		**234,000**		212,000	
Metals - Unfiltered	Manganese	N	ug/L	38		95.5		85.8	
Metals - Unfiltered	Nickel	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Potassium	N	ug/L	88,800	J	111,000		**120,000**	
Metals - Unfiltered	Selenium	N	ug/L	5.2	J	-	-	-	-
Metals - Unfiltered	Sodium	N	ug/L	889,000		1,230,000		1,130,000	
Metals - Unfiltered	Thallium	N	ug/L	-	-	3.8	J	-	-
Metals - Unfiltered	Vanadium	N	ug/L	1.3	J	2.8	J	1.6	J
Metals - Unfiltered	Zinc	N	ug/L	7.7	J	11.6	J	11.5	B
Metals - Filtered	Aluminum	Y	ug/L	24.8	J	43.3	J	52.6	J
Metals - Filtered	Antimony	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Arsenic	Y	ug/L	**36.7**		-	-	-	-
Metals - Filtered	Barium	Y	ug/L	406		329		304	
Metals - Filtered	Cadmium	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Calcium	Y	ug/L	200,000		312,000		275,000	
Metals - Filtered	Copper	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Iron	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Lead	Y	ug/L	-	-	2	J	2.3	J
Metals - Filtered	Magnesium	Y	ug/L	148,000		**231,000**		211,000	

Groundwater Detected Hits Summary

Location Code:				AP1-BEDGW-002		IT-MNTA-BEDGW-001		IT-MNTA-BEDGW-001	
Sample Number:				AP3074		LB3074		BEDGW-001-1109	
Sample Date:				10-Nov-09		19-May-09		6-Nov-09	
Sampel Depth:				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:				REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Filtered	Manganese	Y	ug/L	10.5	J	47		70.2	
Metals - Filtered	Nickel	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Potassium	Y	ug/L	84,800	J	113,000		**120,000**	
Metals - Filtered	Selenium	Y	ug/L	4	J	-	-	4.2	J
Metals - Filtered	Sodium	Y	ug/L	833,000		1,210,000		1,160,000	
Metals - Filtered	Thallium	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Vanadium	Y	ug/L	-	-	2.7	J	0.93	J
Metals - Filtered	Zinc	Y	ug/L	-	-	11.2	J	-	-
Water Quality Parameters	Alkalinity	N	ug/L	728,000		773,000		718,000	
Water Quality Parameters	Chloride	N	ug/L	2,020,000	J	132,000		2,550,000	
Water Quality Parameters	Cyanide, total	N	ug/L	-	-	71		-	-
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L			1,740,000		1,570,000	
Water Quality Parameters	Nitrate-Nitrite	N	ug/L	190	J	-	-	90	J
Water Quality Parameters	Sulfate	N	ug/L	-	-	9,600		-	-
Water Quality Parameters	Total dissolved solids	N	ug/L	3,520,000		5,780,000		4,680,000	
Water Quality Parameters	Total suspended solids	N	ug/L	130,000		53,000		193,000	
Water Quality Parameters	Turbidity	N	NTU	180	J	66	J	71.5	

Groundwater Detected Hits Summary

LOCATION_CODE							AP1-MW01		AP1-MW01		AP1-MW02	
SAMPLE_NO							AP3050		AP3070		AP3051	
SAMPLE_DATE							7-May-09		4-Nov-09		10-May-09	
FK_DEPTH							0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
SAMPLE_PURPOSE							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 TAP-RSL	GW-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	7.3	NE	0.342	-	-	-	-	-	-
Explosives	Nitrotoluene, 2-	N	ug/L	0.31	NE	0.18	-	-	0.18	J	-	-
Explosives	Nitrotoluene, 4-	N	ug/L	4.2	NE	0.17	-	-	0.17	J	-	-
Volatiles	Chloroform	N	ug/L	0.19	NE	0.48	0.48	J	-	-	-	-
Metals - Unfiltered	Aluminum	N	ug/L	3,700	309	9740	26.1	J	191	J	76.8	J
Metals - Unfiltered	Arsenic	N	ug/L	0.045	7.4	6.3	-	-	5.4	J	-	-
Metals - Unfiltered	Barium	N	ug/L	730	11,800	252	28.6	J	37.8	J	61	J
Metals - Unfiltered	Calcium	N	ug/L	NE	316,000	282000	282,000		194,000		207,000	
Metals - Unfiltered	Chromium	N	ug/L	0.043	NE	11.2	-	-	-	-	-	-
Metals - Unfiltered	Cobalt	N	ug/L	1.1	12.1	22.2	**22.2**	J	6.8	J	3	J
Metals - Unfiltered	Copper	N	ug/L	150	19.8	8.93	-	-	-	-	-	-
Metals - Unfiltered	Iron	N	ug/L	2,600	1,550	7030	**4,610**		**4,410**		-	-
Metals - Unfiltered	Lead	N	ug/L	15	NE	4.3	4.3	J	2.6	B	-	-
Metals - Unfiltered	Magnesium	N	ug/L	NE	217,000	92400	77,100		63,200		92,400	
Metals - Unfiltered	Manganese	N	ug/L	88	636	32300	**32,300**		**8,290**		351	
Metals - Unfiltered	Nickel	N	ug/L	73	8.6	15.2	**13.3**	J	4.1		**15.2**	J
Metals - Unfiltered	Potassium	N	ug/L	NE	116,000	28200	2,820	J	6,650	J	28,200	
Metals - Unfiltered	Selenium	N	ug/L	18	NE	5.2	-	-	-	-	4.9	J
Metals - Unfiltered	Sodium	N	ug/L	NE	1,390,000	81300	18,900		42,900		68,400	
Metals - Unfiltered	Thallium	N	ug/L	NE	NE	34.6	34.6		-	-	-	-
Metals - Unfiltered	Vanadium	N	ug/L	18	NE	19.4	-	-	-	-	1.2	J
Metals - Unfiltered	Zinc	N	ug/L	1,100	507	23.2	23.2		8.6	B	13.4	J
Metals - Filtered	Aluminum	Y	ug/L	3,700	309	3320	-	-	-	-	15.5	J
Metals - Filtered	Arsenic	Y	ug/L	0.045	7.4	6.2	-	-	6.2	J	-	-
Metals - Filtered	Barium	Y	ug/L	730	11,800	255	28.4	J	34.9	J	61.7	J
Metals - Filtered	Calcium	Y	ug/L	NE	316,000	283000	283,000		181,000		201,000	
Metals - Filtered	Chromium	Y	ug/L	0.043	NE	5.5	-	-	-	-	-	-
Metals - Filtered	Cobalt	Y	ug/L	1.1	12.1	22.5	**22.5**	J	5.1	J	3.2	J
Metals - Filtered	Copper	Y	ug/L	150	19.8	10.5	-	-	-	-	-	-
Metals - Filtered	Iron	Y	ug/L	2,600	1,550	6070	**4,590**		**4,990**		-	-
Metals - Filtered	Lead	Y	ug/L	15	NE	10.4	5.8		-	-	2	J
Metals - Filtered	Magnesium	Y	ug/L	NE	217,000	90800	77,600		61,000		90,800	
Metals - Filtered	Manganese	Y	ug/L	88	636	32100	**32,100**		**6,270**		355	
Metals - Filtered	Nickel	Y	ug/L	73	8.6	14.8	**12.8**	J	3.9	J	**14.8**	J
Metals - Filtered	Potassium	Y	ug/L	NE	116,000	28500	2,760	J	7,000	J	28,500	
Metals - Filtered	Selenium	Y	ug/L	18	NE	6.9	-	-	-	-	6.9	J
Metals - Filtered	Sodium	Y	ug/L	NE	1,390,000	81700	21,000		44,300		69,900	
Metals - Filtered	Thallium	Y	ug/L	NE	NE	37.8	37.8		-	-	-	-
Metals - Filtered	Vanadium	Y	ug/L	18	NE	5.9	-	-	-	-	1.1	J
Metals - Filtered	Zinc	Y	ug/L	1,100	507	23.4	23.2		9.2	J	12.1	J
Water Quality Parameters	Alkalinity	N	ug/L	NE	NE	448000	448,000		395,000		253,000	
Water Quality Parameters	Chloride	N	ug/L	NE	NE	40000	11,500		40,000		25,600	
Water Quality Parameters	Hardness	N	ug/L	NE	NE	614000						
Water Quality Parameters	Hardness	Y	ug/L	NE	NE	671000						
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L	NE	NE	1020000	1,020,000		745,000		897,000	
Water Quality Parameters	Nitrate-Nitrite	N	ug/L	NE	NE	353	-	-	130	J	-	-
Water Quality Parameters	Sulfate	N	ug/L	NE	NE	589000	585,000		311,000	J	589,000	
Water Quality Parameters	Total dissolved solids	N	ug/L	NE	NE	1890000	1,520,000		1,080,000		1,890,000	
Water Quality Parameters	Total suspended solids	N	ug/L	NE	NE	343000	-	-	25,000		23,000	
Water Quality Parameters	Turbidity	N	NTU	NE	NE	195	8.6		47		5.4	J

Groundwater Detected Hits Summary

LOCATION_CODE				AP1-MW02		AP1-MW03		AP1-MW03	
SAMPLE_NO				AP3071		AP3052		AP3072	
SAMPLE_DATE				6-Nov-09		11-May-09		6-Nov-09	
FK_DEPTH				0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
SAMPLE_PURPOSE				REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	-	-	-	-	-	-
Explosives	Nitrotoluene, 2-	N	ug/L	-	-	-	-	-	-
Explosives	Nitrotoluene, 4-	N	ug/L	-	-	-	-	-	-
Volatiles	Chloroform	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	ug/L	68.7	J	**1,110**	J	17.2	J
Metals - Unfiltered	Arsenic	N	ug/L	-	-	-	-	6.3	J
Metals - Unfiltered	Barium	N	ug/L	53.1	J	252		154	J
Metals - Unfiltered	Calcium	N	ug/L	169,000		93,400		94,300	
Metals - Unfiltered	Chromium	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Cobalt	N	ug/L	3.6	J	1	J	2.7	J
Metals - Unfiltered	Copper	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Iron	N	ug/L	-	-	1,090		-	-
Metals - Unfiltered	Lead	N	ug/L	2	B	2.2	J	2.4	B
Metals - Unfiltered	Magnesium	N	ug/L	74,900		39,100		38,700	
Metals - Unfiltered	Manganese	N	ug/L	436		136		463	
Metals - Unfiltered	Nickel	N	ug/L	5.8	J	7.4	J	4.7	J
Metals - Unfiltered	Potassium	N	ug/L	21,900		20,700		19,300	
Metals - Unfiltered	Selenium	N	ug/L	3.7	J	4.7	J	5.2	J
Metals - Unfiltered	Sodium	N	ug/L	81,300		52,400		59,300	
Metals - Unfiltered	Thallium	N	ug/L	-	-	-	-	-	-
Metals - Unfiltered	Vanadium	N	ug/L	-	-	2.9	J	-	-
Metals - Unfiltered	Zinc	N	ug/L	-	-	14.3	J	7.7	B
Metals - Filtered	Aluminum	Y	ug/L	12.8	J	19.1	J	**3,320**	
Metals - Filtered	Arsenic	Y	ug/L	-	-	-	-	5.7	J
Metals - Filtered	Barium	Y	ug/L	51.6	J	255		177	J
Metals - Filtered	Calcium	Y	ug/L	165,000		90,500		95,500	
Metals - Filtered	Chromium	Y	ug/L	-	-	-	-	5.5	J
Metals - Filtered	Cobalt	Y	ug/L	3.6	J	-	-	5.1	J
Metals - Filtered	Copper	Y	ug/L	-	-	-	-	10.5	J
Metals - Filtered	Iron	Y	ug/L	-	-	-	-	6,070	
Metals - Filtered	Lead	Y	ug/L	2.2	J	-	-	4.9	J
Metals - Filtered	Magnesium	Y	ug/L	75,000		38,400		39,200	
Metals - Filtered	Manganese	Y	ug/L	410		102		550	
Metals - Filtered	Nickel	Y	ug/L	6.1	J	6.6	J	**13.4**	J
Metals - Filtered	Potassium	Y	ug/L	22,000		20,400		20,500	
Metals - Filtered	Selenium	Y	ug/L	-	-	5.3	J	-	-
Metals - Filtered	Sodium	Y	ug/L	81,700		53,900		60,500	
Metals - Filtered	Thallium	Y	ug/L	-	-	-	-	-	-
Metals - Filtered	Vanadium	Y	ug/L	-	-	0.9	J	5.9	J
Metals - Filtered	Zinc	Y	ug/L	11.4	J	11.4	J	23.4	
Water Quality Parameters	Alkalinity	N	ug/L	313,000		349,000		391,000	
Water Quality Parameters	Chloride	N	ug/L	35,400		38,700		37,000	
Water Quality Parameters	Hardness	N	ug/L						
Water Quality Parameters	Hardness	Y	ug/L						
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L	730,000		394,000		395,000	
Water Quality Parameters	Nitrate-Nitrite	N	ug/L	41	J	-	-	55	J
Water Quality Parameters	Sulfate	N	ug/L	358,000	J	127,000		109,000	
Water Quality Parameters	Total dissolved solids	N	ug/L	1,230,000		660,000		619,000	
Water Quality Parameters	Total suspended solids	N	ug/L	6,000	J	78,000		300,000	
Water Quality Parameters	Turbidity	N	NTU	3.4		18.7		27.8	

Groundwater Detected Hits Summary

LOCATION_CODE				ASH PIT 1-PZ01		ASH PIT 1-PZ02		ASH PIT 1-PZ04	
SAMPLE_NO				AP3000		AP3001		AP3003	
SAMPLE_DATE				12-Dec-08		11-Dec-08		15-Dec-08	
FK_DEPTH				19 - 19 Ft		16 - 16 Ft		20 - 20 Ft	
SAMPLE_PURPOSE				REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	-	-	-	-	-	-
Explosives	Nitrotoluene, 2-	N	ug/L	-	-	-	-	-	-
Explosives	Nitrotoluene, 4-	N	ug/L	-	-	-	-	-	-
Volatiles	Chloroform	N	ug/L						
Metals - Unfiltered	Aluminum	N	ug/L	9,740		3,790			
Metals - Unfiltered	Arsenic	N	ug/L	-	-	-	-		
Metals - Unfiltered	Barium	N	ug/L	90.1		72.9			
Metals - Unfiltered	Calcium	N	ug/L	124,000		118,000			
Metals - Unfiltered	Chromium	N	ug/L	11.2		-	-		
Metals - Unfiltered	Cobalt	N	ug/L	-	-	2.91	J		
Metals - Unfiltered	Copper	N	ug/L	8.93	J	8.6	J		
Metals - Unfiltered	Iron	N	ug/L	7,030		3,400			
Metals - Unfiltered	Lead	N	ug/L	-	-	3.2	J		
Metals - Unfiltered	Magnesium	N	ug/L	34,400		33,000			
Metals - Unfiltered	Manganese	N	ug/L	71.4		306			
Metals - Unfiltered	Nickel	N	ug/L	4.07	J	4.51	J		
Metals - Unfiltered	Potassium	N	ug/L	4,270		1,680			
Metals - Unfiltered	Selenium	N	ug/L	-	-	-	-		
Metals - Unfiltered	Sodium	N	ug/L	11,500		9,740			
Metals - Unfiltered	Thallium	N	ug/L	-	-	-	-		
Metals - Unfiltered	Vanadium	N	ug/L	19.4		8.07			
Metals - Unfiltered	Zinc	N	ug/L	-	-	-	-		
Metals - Filtered	Aluminum	Y	ug/L	-	-	-	-		
Metals - Filtered	Arsenic	Y	ug/L	-	-	-	-		
Metals - Filtered	Barium	Y	ug/L	37.1		30.5			
Metals - Filtered	Calcium	Y	ug/L	131,000		101,000			
Metals - Filtered	Chromium	Y	ug/L	-	-	-	-		
Metals - Filtered	Cobalt	Y	ug/L	-	-	-	-		
Metals - Filtered	Copper	Y	ug/L	-	-	-	-		
Metals - Filtered	Iron	Y	ug/L	-	-	-	-		
Metals - Filtered	Lead	Y	ug/L	-	-	10.4			
Metals - Filtered	Magnesium	Y	ug/L	33,200		27,100			
Metals - Filtered	Manganese	Y	ug/L	10.7		35.2			
Metals - Filtered	Nickel	Y	ug/L	-	-	-	-		
Metals - Filtered	Potassium	Y	ug/L	898		657			
Metals - Filtered	Selenium	Y	ug/L	-	-	-	-		
Metals - Filtered	Sodium	Y	ug/L	12,000		11,100			
Metals - Filtered	Thallium	Y	ug/L	-	-	5.08	J		
Metals - Filtered	Vanadium	Y	ug/L	-	-	-	-		
Metals - Filtered	Zinc	Y	ug/L	-	-	-	-		
Water Quality Parameters	Alkalinity	N	ug/L	133,000		172,000			
Water Quality Parameters	Chloride	N	ug/L	12,100		3,560			
Water Quality Parameters	Hardness	N	ug/L	451,000		431,000			
Water Quality Parameters	Hardness	Y	ug/L	464,000		363,000			
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L						
Water Quality Parameters	Nitrate-Nitrite	N	ug/L	97		353			
Water Quality Parameters	Sulfate	N	ug/L	61,700		39,400			
Water Quality Parameters	Total dissolved solids	N	ug/L	484,000		384,000			
Water Quality Parameters	Total suspended solids	N	ug/L	161,000		343,000			
Water Quality Parameters	Turbidity	N	NTU	111		195			

LOCATION_CODE				ASH PIT 1-PZ04		ASH PIT 1-PZ04		ASH PIT 1-PZ05	
SAMPLE_NO				WW3005		WW3013		AP3004	
SAMPLE_DATE				15-Dec-08		15-Dec-08		15-Dec-08	
FK_DEPTH				20 - 20 Ft		20 - 20 Ft		20 - 20 Ft	
SAMPLE_PURPOSE				FD		FS		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Amino-2,6-dinitrotoluene, 4-	N	ug/L	-	-	-	-	0.342	J
Explosives	Nitrotoluene, 2-	N	ug/L	-	-	-	-	-	-
Explosives	Nitrotoluene, 4-	N	ug/L	-	-	-	-	-	-
Volatiles	Chloroform	N	ug/L						
Metals - Unfiltered	Aluminum	N	ug/L					**2,080**	
Metals - Unfiltered	Arsenic	N	ug/L					-	-
Metals - Unfiltered	Barium	N	ug/L					41.5	B
Metals - Unfiltered	Calcium	N	ug/L					159,000	
Metals - Unfiltered	Chromium	N	ug/L					-	-
Metals - Unfiltered	Cobalt	N	ug/L					-	-
Metals - Unfiltered	Copper	N	ug/L					-	-
Metals - Unfiltered	Iron	N	ug/L					**2,580**	
Metals - Unfiltered	Lead	N	ug/L					-	-
Metals - Unfiltered	Magnesium	N	ug/L					52,700	
Metals - Unfiltered	Manganese	N	ug/L					3,370	
Metals - Unfiltered	Nickel	N	ug/L					-	-
Metals - Unfiltered	Potassium	N	ug/L					9,130	
Metals - Unfiltered	Selenium	N	ug/L					-	-
Metals - Unfiltered	Sodium	N	ug/L					59,400	B
Metals - Unfiltered	Thallium	N	ug/L					-	-
Metals - Unfiltered	Vanadium	N	ug/L					4.24	J
Metals - Unfiltered	Zinc	N	ug/L					-	-
Metals - Filtered	Aluminum	Y	ug/L					-	-
Metals - Filtered	Arsenic	Y	ug/L					-	-
Metals - Filtered	Barium	Y	ug/L					32.2	B
Metals - Filtered	Calcium	Y	ug/L					175,000	
Metals - Filtered	Chromium	Y	ug/L					-	-
Metals - Filtered	Cobalt	Y	ug/L					-	-
Metals - Filtered	Copper	Y	ug/L					-	-
Metals - Filtered	Iron	Y	ug/L					94.7	B
Metals - Filtered	Lead	Y	ug/L					-	-
Metals - Filtered	Magnesium	Y	ug/L					56,600	
Metals - Filtered	Manganese	Y	ug/L					3,540	
Metals - Filtered	Nickel	Y	ug/L					-	-
Metals - Filtered	Potassium	Y	ug/L					9,270	
Metals - Filtered	Selenium	Y	ug/L					-	-
Metals - Filtered	Sodium	Y	ug/L					62,500	B
Metals - Filtered	Thallium	Y	ug/L					-	-
Metals - Filtered	Vanadium	Y	ug/L					-	-
Metals - Filtered	Zinc	Y	ug/L					-	-
Water Quality Parameters	Alkalinity	N	ug/L					246,000	
Water Quality Parameters	Chloride	N	ug/L						
Water Quality Parameters	Hardness	N	ug/L					614,000	
Water Quality Parameters	Hardness	Y	ug/L					671,000	
Water Quality Parameters	HARDNESS (as CaCO3)	N	ug/L						
Water Quality Parameters	Nitrate-Nitrite	N	ug/L					35	J
Water Quality Parameters	Sulfate	N	ug/L						
Water Quality Parameters	Total dissolved solids	N	ug/L					1,000,000	
Water Quality Parameters	Total suspended solids	N	ug/L					66,000	
Water Quality Parameters	Turbidity	N	NTU					101	

Sediment Detected Hits Summary

Location Code:						AP1-SD01		AP1-SD02		AP1-SD03		AP1-SD04	
Sample Number:						AP1007		AP1008		AP1012		AP1013	
Sample Date:						19-May-09		19-May-09		19-May-09		20-May-09	
Sample Depth:						0 - .5 Ft		0 - .5 Ft		0 - .5 Ft		0 - .5 Ft	
Sample Purpose:						REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 SED-RSL	MDC	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Benzo(a)anthracene	N	mg/kg	1.5	0.143	-	-	-	-	-	-	0.121	J
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.15	0.158	-	-	-	-	-	-	0.112	J
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	1.5	0.24	-	-	-	-	-	-	0.175	J
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	0.101	-	-	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	15	0.0805	-	-	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	150	0.159	-	-	-	-	-	-	0.149	J
Semivolatiles	Dibenzofuran	N	mg/kg	78	0.15	-	-	-	-	-	-	0.15	J
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	6,100	0.18	-	-	0.18	J	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	2,300	0.253	-	-	-	-	-	-	0.191	J
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	1.5	0.111	-	-	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	310	0.616	-	-	-	-	-	-	0.616	
Semivolatiles	Naphthalene	N	mg/kg	36	0.337	-	-	-	-	-	-	0.337	J
Semivolatiles	Phenanthrene	N	mg/kg	NE	0.306	-	-	-	-	-	-	0.306	J
Semivolatiles	Pyrene	N	mg/kg	1,700	0.206	-	-	-	-	-	-	0.195	J
Pesticides/PCBs	Aroclor 1254	N	mg/kg	1.1	0.0352	0.025	J	-	-	-	-	0.0352	J
Pesticides/PCBs	Aroclor 1260	N	mg/kg	2.2	0.113	0.0207	J	-	-	-	-	0.113	J
Metals - Unfiltered	Aluminum	N	mg/kg	77,000	9880	9,880		7,130		4,490		9,860	
Metals - Unfiltered	Antimony	N	mg/kg	31	1.3	0.5	J	0.7	J	-	-	1.3	J
Metals - Unfiltered	Arsenic	N	mg/kg	3.9	15.9	7.6		9.3		4		15.9	
Metals - Unfiltered	Barium	N	mg/kg	15,000	110	57.5		35.7		31.3		110	
Metals - Unfiltered	Beryllium	N	mg/kg	160	1.6	0.62		0.5		0.3	J	1.6	
Metals - Unfiltered	Cadmium	N	mg/kg	70	0.59	0.55		0.32		0.23	J	0.59	
Metals - Unfiltered	Calcium	N	mg/kg	NE	29900	29,900		10,400		16,800		13,700	
Metals - Unfiltered	Chromium	N	mg/kg	2.9	16.9	16.9		11.8		7.8		15.6	
Metals - Unfiltered	Cobalt	N	mg/kg	23	9.9	9.9		8.9		4.4		9.1	
Metals - Unfiltered	Copper	N	mg/kg	3,100	126	38.5		17.1		10.5		24.5	
Metals - Unfiltered	Iron	N	mg/kg	55,000	21700	21,700		19,300		9,270		21,400	
Metals - Unfiltered	Lead	N	mg/kg	400	23.7	23.7		13		7	J	22.9	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	9370	9,370		4,360		4,970		1,810	
Metals - Unfiltered	Manganese	N	mg/kg	1,800	1670	446		337		165		1,670	
Metals - Unfiltered	Mercury	N	mg/kg	23	0.14	0.14		0.024	J	0.021	J	0.11	J
Metals - Unfiltered	Nickel	N	mg/kg	1,500	26.7	26.7		21.3		12		25.7	
Metals - Unfiltered	Potassium	N	mg/kg	NE	1740	1,740		1,170		725	J	1,340	
Metals - Unfiltered	Selenium	N	mg/kg	390	1.3	0.32	J	0.38	J	-	-	1.3	J
Metals - Unfiltered	Silver	N	mg/kg	390	0.099	0.099	J	-	-	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	112	112	J	-	-	83.1	J	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	390	25.5	21.9		19.2		12.4		25.5	
Metals - Unfiltered	Zinc	N	mg/kg	23,000	137	98.9		45.3		33.3		137	
Water Quality Parameters	% Solids	N	Percent	NE	76.3	62.6		76.3		63.8		40.1	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	43000	21,000						43,000	

Sediment Detected Hits Summary

Location Code:				AP3-SD01		AP3-SD02		AP3-SD03	
Sample Number:				AP1009		AP1010		AP1011	
Sample Date:				23-May-09		23-May-09		23-May-09	
Sample Depth:				0 - .5 Ft		0 - .5 Ft		0 - .5 Ft	
Sample Purpose:				REG		REG		REG	
Test Group	Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.143	J				
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.158	J				
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.24	J				
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	0.101	J				
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	0.0805	J				
Semivolatiles	Chrysene	N	mg/kg	0.159	J				
Semivolatiles	Dibenzofuran	N	mg/kg	-	-				
Semivolatiles	Di-n-butyl phthalate	N	mg/kg	-	-				
Semivolatiles	Fluoranthene	N	mg/kg	0.253	J				
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.111	J				
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	-	-				
Semivolatiles	Naphthalene	N	mg/kg	-	-				
Semivolatiles	Phenanthrene	N	mg/kg	-	-				
Semivolatiles	Pyrene	N	mg/kg	0.206	J				
Pesticides/PCBs	Aroclor 1254	N	mg/kg	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	3,610					
Metals - Unfiltered	Antimony	N	mg/kg	0.54	J				
Metals - Unfiltered	Arsenic	N	mg/kg	6.4					
Metals - Unfiltered	Barium	N	mg/kg	26.6					
Metals - Unfiltered	Beryllium	N	mg/kg	0.26	J				
Metals - Unfiltered	Cadmium	N	mg/kg	0.3	J				
Metals - Unfiltered	Calcium	N	mg/kg	9,610	J				
Metals - Unfiltered	Chromium	N	mg/kg	6.4					
Metals - Unfiltered	Cobalt	N	mg/kg	4.1	J				
Metals - Unfiltered	Copper	N	mg/kg	126					
Metals - Unfiltered	Iron	N	mg/kg	13,000	J				
Metals - Unfiltered	Lead	N	mg/kg	8.7	J				
Metals - Unfiltered	Magnesium	N	mg/kg	4,370	J				
Metals - Unfiltered	Manganese	N	mg/kg	130	J				
Metals - Unfiltered	Mercury	N	mg/kg	0.027	J				
Metals - Unfiltered	Nickel	N	mg/kg	10.5	J				
Metals - Unfiltered	Potassium	N	mg/kg	337	J				
Metals - Unfiltered	Selenium	N	mg/kg	0.54	B				
Metals - Unfiltered	Silver	N	mg/kg	-	-				
Metals - Unfiltered	Sodium	N	mg/kg	-	-				
Metals - Unfiltered	Vanadium	N	mg/kg	11.3					
Metals - Unfiltered	Zinc	N	mg/kg	52.8	J				
Water Quality Parameters	% Solids	N	Percent	54.3		55.4		68.4	
Water Quality Parameters	Total organic carbon	N	mg/kg	28,000					

Soil Detected Hits Summary

Location Code:							ASH PIT 1-SB01		ASH PIT 1-SB01		ASH PIT 1-SB01	
Sample Number:							AP0001		AP0002		AP0003	
Sample Date:							8-Dec-08		8-Dec-08		8-Dec-08	
Sample Depth:							.5 - 1.5 Ft		3.5 - 5.5 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	0.0477	QJ	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	0.0378	QJ	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-		
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	6,190	J	9,230	J	8,980	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.258	J	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	6.7	J	8.3	J	4.54	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	32.7	J	37.7	J	51.5	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**5.74**	J	**4.87**	J	**5.82**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	14,400		35,200		50,900	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	10.6		13.9		13.4	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	5.47		6.18		9.22	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	15.4	J	25.4	J	27.6	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	17,200		15,600		20,200	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	6.61		12.3		10.9	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	5,030		**13,700**		**18,600**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	263		251		524	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	-	-	-	-	0.0162	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	3.93	J	13.3	J	16.9	J
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	577	J	1,130	J	1,270	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	57.6		96		151	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.366	J	0.271	J
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	20.7	J	19.3	J	20.9	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	44.4		57.1		58.7	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3	55.3	J				

Soil Detected Hits Summary

Location Code:							ASH PIT 1-SB02		ASH PIT 1-SB02		ASH PIT 1-SB02	
Sample Number:							AP0004		AP0005		AP0006	
Sample Date:							8-Dec-08		8-Dec-08		8-Dec-08	
Sample Depth:							0 - 1 Ft		3 - 3.8 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-				
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,360	J	8,380	J	7,780	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.294	J	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	9.14	J	6.17	J	4.3	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	83.3	J	35.9	J	56.1	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**10.8**	J	**5.99**	J	**5.23**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.345	J	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	18,800		46,600		45,700	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	12.4		11.9		11.5	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	8.57		9.76		8.14	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	27.3	J	37.7	J	24.4	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	36,500		21,500		18,000	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	9.65		14.6		11.4	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	5,830		**16,500**		**20,100**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	306		543		472	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.0357		0.0196	J	0.0159	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	-	-	18.7	J	15	J
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,190	J	1,110	J	1,080	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.618	J	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	114		131		137	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.343	J	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	26.3	J	20.6	J	20.3	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	55.2		72.7		55.4	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Soil Detected Hits Summary

Location Code:							ASH PIT 1-SB03		ASH PIT 1-SB03		ASH PIT 1-SB03	
Sample Number:							AP0007		AP0008		AP0009	
Sample Date:							9-Dec-08		9-Dec-08		9-Dec-08	
Sample Depth:							0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-		
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,940		2,770		8,470	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	0.347	J	-	-	0.267	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	13.2		5.62		6.7	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	107		13		46.7	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**13.9**	J	**3.62**	J	**5.49**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	-	-	0.277	J
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	9,390		26,700		48,600	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	13.6		5.51		11.7	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	9.92		3.23		8.43	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	30.5		7.71		27.3	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	63,100		10,600		18,900	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	9.59		7.75		12.3	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,500		6,420		**17,100**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	252		266		470	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	**0.0928**		-	-	0.0151	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	-	-	1.71		14.7	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,260		299		1,070	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.567	J	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	96.8		61.3		132	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	0.563		-	-	0.301	J
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	29.9	J	15.1	J	20.5	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	57.1		23.1		54.1	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB04		ASH PIT 1-SB04		ASH PIT 1-SB04	
Sample Number:							AP0010		AP0011		AP0012	
Sample Date:							9-Dec-08		9-Dec-08		9-Dec-08	
Sample Depth:							0 - 1 Ft		3 - 4 Ft		3 - 4 Ft	
Sample Purpose:							REG		REG		FD	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	0.0661	J	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	0.055	J	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101			-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	12,700		7,340		6,910	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	0.352	J	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	11.7		3.72		3.42	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	105		52.8		132	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**16.5**	J	**6.43**	J	**8.18**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.25	J	0.313	J
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	3,330		2,570		2,790	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	12		11.7		11.5	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	8.92		26.8		28.9	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	50		9.5		11.3	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	90,300		18,700		27,400	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	11.3		7.25		8.13	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	782		1,150		1,020	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	241		871		1,240	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	**0.383**		0.0305		0.0301	
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	-	-	14.4		8.92	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,280		298		281	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.6	J	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	119		26		24	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	0.356	J	-	-	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	32.4	J	22	J	26.1	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	55.3		63.4		75.1	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Soil Detected Hits Summary

Location Code:							ASH PIT 1-SB04		ASH PIT 1-SB04		ASH PIT 1-SB05	
Sample Number:							AP0013		AP0062		AP0014	
Sample Date:							9-Dec-08		9-Dec-08		9-Dec-08	
Sample Depth:							8 - 10 Ft		3 - 4 Ft		0 - 1 Ft	
Sample Purpose:							REG		FS		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	0.942	J
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	0.764	J
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	0.275	J
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101			-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	10,200		6,680		10,700	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	0.304	J	-	-	0.416	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	8.59		6.2		9.06	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	451		42.8		82.7	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	-	-	-	-	**13.6**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	0.276	J	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	2,300		2,300		35,100	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	17.7		11		16.4	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	62.2		27.4		8.36	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	30.7		7.9		47.9	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	32,800		21,900		64,800	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	19.2		6.8		12.3	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	3,480		1,140		4,010	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	4,470		556		305	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.0195	J	-	-	0.0756	
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	43.4		27.9		-	-
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	948		-	-	1,160	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	-	-	0.592	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	45.9		-	-	165	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	0.354	J	-	-	0.303	J
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	29.3	J	20.5		27.9	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	87		60.7		62.8	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6			80.6			
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB05		ASH PIT 1-SB05		ASH PIT 1-SB06	
Sample Number:							AP0015		AP0016		AP0017	
Sample Date:							9-Dec-08		9-Dec-08		8-Dec-08	
Sample Depth:							3 - 3.7 Ft		8 - 9 Ft		.8 - 1.8 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-			-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	6,260		8,810		10,500	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.276	J	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	11.6		5.78		6.4	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	168		45.5		62.6	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**12.9**	J	**7**	J	**11.5**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	0.269	J	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	2,960		36,000		4,580	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	13.5		13.7		14.6	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	20.5		10.3		10.1	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	10.4		29.2		20.5	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	62,000		23,600		41,100	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	5.69		12		8.3	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	961		**15,600**		1,730	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	954		484		199	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.0592		0.0222	J	0.0146	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	-	-	16.1		-	-
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	164		1,110		643	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	0.984	U	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	34.9		107		70.4	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.405	J	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	37.6	J	24.2	J	28.2	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	92.4		65.4		85.4	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB06		ASH PIT 1-SB06	
Sample Number:							AP0018		AP0019	
Sample Date:							8-Dec-08		8-Dec-08	
Sample Depth:							5 - 5.8 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-		
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	13,000	J	8,870	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.287	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	7.53	J	10.4	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	73.6	J	32.6	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**6.55**	J	**6.71**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	7.66	
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	37,800		39,300	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	19.5		13.4	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	10.1		11.2	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	27	J	32.7	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	22,600		23,000	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	12.2		13.1	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	**11,700**		**11,600**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	701		373	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	-	-	0.0148	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	23.7	J	21.2	J
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,580	J	1,260	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	0.761	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	117		118	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	0.239	J	0.663	
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	24.3	J	17	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	67.2		78	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6				
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3				

Location Code:							ASH PIT 1-SB08		ASH PIT 1-SB08		ASH PIT 1-SB08	
Sample Number:							AP0023		AP0024		AP0025	
Sample Date:							9-Dec-08		9-Dec-08		9-Dec-08	
Sample Depth:							0 - 1 Ft		3 - 5 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	0.31	J	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	0.231	J	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	1.02	J	0.0642	J	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	0.839	J	0.0534	J	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	1.34	J	0.0829	J	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	0.989	J	0.0675	J	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	2.06	J	0.126	J	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	1.95	J	0.312	J	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	0.299	J	0.0553	J	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	0.796	J	0.075	J	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	1.5	J	0.102	J	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	0.101	J	-	-		
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	7,200		6,700	J	11,700	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	0.897		0.348	J	0.26	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	10.7		9.98	J	5.65	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	89.5		109		42.3	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**12**	J	**11.5**	J	**7.18**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	0.279	J	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	10,800		5,380	J	40,400	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	10.8		8.34		17	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	7.28		5.37		10.1	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	30.7		21.3		28.4	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	45,900		47,000		24,400	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	28.8		9.36		13.6	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,510		839		**12,100**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	343		469		347	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	**0.163**		0.0516		-	-
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	-	-	-	-	18.8	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	678		559		1,370	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.512	J	0.559	J	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	65.3	J	87.4		98.5	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	0.292	J	0.275	J	0.333	J
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	23.8	J	18.9	J	25.3	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	69.1		38.1		63.6	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB08		ASH PIT 1-SB08		ASH PIT 1-SB09	
Sample Number:							AP0057		AP0063		AP0026	
Sample Date:							9-Dec-08		9-Dec-08		8-Dec-08	
Sample Depth:							0 - 1 Ft		0 - 1 Ft		0 - 1 Ft	
Sample Purpose:							FS		FD		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	0.247	J	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	0.2	J	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	0.58		0.691	J	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	0.55		0.603	J	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	0.77		1.07	J	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	0.58		0.711	J	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	0.0757	QJ
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	1.3		1.69	J	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	1.68	J	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	0.363	QJ
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	0.247	J
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	0.51		0.866	J	0.156	J
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	0.96		1.14	J	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,080		7,910		7,650	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.779		-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	12.6		11.2		12.6	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	76.5		79.3		84.9	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	-	-	**10.2**	J	**8.94**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	0.82		-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	9,820		14,000		15,600	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	11.6		15.2		10.7	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	6.7		6.15		6.2	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	30.7		33.1		18.2	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	44,200		47,100		26,500	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	19.6		25.3		6.28	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,600		2,320		3,740	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	254		341		2,810	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	**0.16**		**0.151**		0.0383	
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	16.8		-	-	-	-
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	875		630		1,040	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	-	-	113	J	161	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.256	J	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	18.4		19.9	J	20.7	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	47.4		57.7		34.8	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	77.3					
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB09		ASH PIT 1-SB09		ASH PIT 1-SB09	
Sample Number:							AP0027		AP0028		AP0058	
Sample Date:							8-Dec-08		8-Dec-08		8-Dec-08	
Sample Depth:							3 - 4 Ft		8 - 10 Ft		8 - 10 Ft	
Sample Purpose:							REG		REG		FD	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	0.0778	J	0.0887	J
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101						
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	7,640	J	8,650	J	8,130	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	5.13	J	9.16	J	9.95	J
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	39	J	41.1	J	37.6	J
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**5.85**	J	**7.08**	J	**6.73**	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	46,200		37,700		39,800	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	11.7		13.5		12	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	8.95		10.7		10.3	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	26.6	J	30.1	J	31.4	J
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	20,600		24,200		24,200	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	9		12.3		11.5	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	**16,100**		10,300		**10,400**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	506		433		473	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.0124	J	0.0142	J	0.0146	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	13.5	J	17.1	J	17.2	J
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,010	J	1,270	J	1,180	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	-	-	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	111		149		156	
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.349	J	0.446	J
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	19.1	J	16.4	J	16.6	J
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	63.3		82.4		68.6	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6						
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 1-SB09		ASH PIT 3-SB01		ASH PIT 3-SB01	
Sample Number:							AP0061		AP0032		AP0033	
Sample Date:							8-Dec-08		19-Aug-09		19-Aug-09	
Sample Depth:							8 - 10 Ft		0 - 1 Ft		3 - 5 Ft	
Sample Purpose:							FS		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	0.0563	J	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	0.0516	J	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	0.156	J	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	0.168	J	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	0.268		-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	0.0882	J	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	0.0972	J	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	0.19	J	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	0.401		-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	0.0914	J	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	0.107	J	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	0.273		-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101			0.015	J	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	10,700		5,060	J	7,010	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	8.2		7.7		5	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	73.9		59		41.2	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	-	-	0.69		0.5	
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.33		0.18	J
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	50,200		8,460	J	49,300	J
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	17		8.8	J	10.3	J
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	10.8		4.5	J	6.7	J
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	23.1		**124**		18.4	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	24,100		12,400	J	14,500	J
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	9.2		16.5		9.3	J
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	**15,000**		2,640	J	**16,600**	J
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	431		99.2	J	410	J
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	-	-	**0.15**		0.015	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	27.8		13		17.1	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	2,440		524	J	1,970	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	-	-	1.1	J	0.84	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	-	-	238	J	293	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	-	-	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	19.6		14.1		16.3	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	57.6		70.5	J	44.7	J
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	82.6		67.3		80.6	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB02		ASH PIT 3-SB02		ASH PIT 3-SB03	
Sample Number:							AP0036		AP0037		AP0039	
Sample Date:							19-Aug-09		19-Aug-09		19-Aug-09	
Sample Depth:							0 - 1 Ft		3 - 5 Ft		0 - 1 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	0.0512	J	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	7,580	J	10,400	J	8,820	J
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	4.9		12.9		12.4	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	48.1		85.7		90.7	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	0.57		**1.5**		**1.7**	
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	-	-	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	11,700	J	9,690	J	11,200	J
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	11	J	14.9	J	14.3	J
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	5.7	J	6.3	J	6.7	J
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	11.6		16.2		14.2	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	13,300	J	24,700	J	20,100	J
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	9.7		3.4	J	3.9	J
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	5,000	J	891	J	1,210	J
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	353	J	120	J	148	J
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.047	J	-	-	0.036	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	13.6		13.4		15.1	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	818	J	1,570	J	1,290	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.59	J	**2.2**	J	1.9	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	196	J	640	J	570	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	-	-	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	19.3		24.3		23.2	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	40.4	J	30.5	J	15.9	J
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	77.2		36.4		38.9	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB03		ASH PIT 3-SB04		ASH PIT 3-SB04	
Sample Number:							AP0040		AP0042		AP0043	
Sample Date:							19-Aug-09		21-Aug-09		21-Aug-09	
Sample Depth:							3 - 5 Ft		0 - 1 Ft		3 - 5 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	0.043	J	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	10,400	J	8,240		4,870	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	11.7		29		8.5	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	107		127		41.5	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**1.9**		**2.1**		0.4	
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.3	J	0.2	J
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	10,400	J	15,900		47,500	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	15.4	J	15.5		7.7	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	9.2	J	8.9		5.9	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	21.4		43.6		15	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	20,500	J	24,000		11,200	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	7.3	J	20.4		8.1	J
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,170	J	2,300		**14,900**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	188	J	322		362	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.044	J	**0.13**	J	0.014	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	23.7		22.9		14.3	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,150	J	1,060	J	1,290	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	**2.7**	J	**2.9**	J	1.1	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	497	J	510	J	224	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	-	-	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	24		28.4		13.3	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	52.6	J	68.3		37	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	38.4		33.6		81.5	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB05		ASH PIT 3-SB05		ASH PIT 3-SB06	
Sample Number:							AP0045		AP0046		AP0048	
Sample Date:							21-Aug-09		21-Aug-09		20-Aug-09	
Sample Depth:							0 - 1 Ft		3 - 5 Ft		0 - 1 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	0.0562	J	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,350		6,010		8,770	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.67	J	1.2	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	13.7		20.3		12.7	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	82.2		63.7		203	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**1.5**		0.47		0.74	
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.21	J	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	12,800		**52,800**		2,060	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	13.6		9.6		9.6	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	7.4		5.8		4.5	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	19.3		17.5		21.6	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	22,800		16,700		68,300	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	12.5	J	9.6	J	4.5	J
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,120		**17,500**		343	J
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	339		432		54.5	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	-	-	0.03	J	-	-
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	17.2		16.4		11.5	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,110	J	1,490		923	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	1.7	J	1.1	J	1.4	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	531	J	261	J	493	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	-	-	**3**	
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	23.7		15.5		15.1	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	66.3		41.6		17.2	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	37.9		78.3		63.6	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB06		ASH PIT 3-SB06		ASH PIT 3-SB07	
Sample Number:							AP0049		AP0061A		AP0051	
Sample Date:							20-Aug-09		20-Aug-09		21-Aug-09	
Sample Depth:							3 - 5 Ft		2 - 2.7 Ft		0 - 1 Ft	
Sample Purpose:							REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	11,400		7,840		4,760	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	1.3	J	0.93	J	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	16.7		30.6		7.7	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	113		65.1		38.5	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	0.92		0.56		0.41	J
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.17	J	0.44	
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	3,200		46,100		14,100	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	12		11.8		6.9	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	6.3		8.5		5	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	26.5		17.6		38.9	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	67,800		20,500		15,200	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	7	J	10	J	12.2	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	610		**15,700**		3,130	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	81.7		402		217	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.037	J	0.016	J	0.066	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	16		18.8		13.1	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	1,380		1,900		634	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	1.5	J	**2.1**	J	1.6	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	634	J	300	J	168	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	**2.9**		-	-	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	19.5		17.7		10.7	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	31.3		49.3		78.7	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	48.1		79.2		53.1	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB07		ASH PIT 3-SB07		ASH PIT 3-SB07	
Sample Number:							AP0052		AP0059		AP0060	
Sample Date:							21-Aug-09		21-Aug-09		21-Aug-09	
Sample Depth:							3 - 5 Ft		3 - 5 Ft		3 - 5 Ft	
Sample Purpose:							REG		FD		FS	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-	-	-	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,910		9,620		8,630	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	0.72	J	-	-	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	9.3		6.9		7	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	70.5		70.1		77.2	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	0.67		0.63		-	-
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	0.21	J	0.19	J	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	42,400		47,800		**54,300**	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	15		14.5		14.8	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	8.1		7.3		8.4	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	21.7		19.4		15.4	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	17,700		14,900		17,500	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	11.9	J	11.2	J	9.5	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	**15,800**		**17,500**		**19,400**	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	477		460		498	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.026	J	0.022	J	-	-
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	22.7		21.4		20.5	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	2,110		2,110		1,770	
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	0.9	J	0.98	J	-	-
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	269	J	280	J	-	-
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	-	-	**2.7**	
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	21.9		21.1		19.7	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	53.2		49.5		59.3	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	78.2		76.5		78.3	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB08		ASH PIT 3-SB08		ASH PIT 3-SB08	
Sample Number:							AP0054		AP0055		AP0056	
Sample Date:							21-Aug-09		21-Aug-09		21-Aug-09	
Sample Depth:							0 - 1 Ft		3 - 5 Ft		3 - 5 Ft	
Sample Purpose:							REG		REG		FD	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual	Result	ValQual	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	0.0547	J	-	-	0.0776	J
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-	-	-	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-	-	-	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-	-	-	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-	-	-	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-	-	-	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-	-	-	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-	-	-	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-	-	-	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-	-	-	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-	-	-	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-	-	-	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-	-	-	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-	-	-	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-	-	-	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-	-	-	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-	-	-	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	7,540		8,970		10,400	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-	0.5	J	0.88	J
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	27.3		32.7		**60.8**	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	83.5		98.4		110	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	**1.6**		0.64		**2**	
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-	0.14	J	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	17,700		28,000		14,900	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	14.3		12.6		18.8	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	7.6		12.2		8.1	
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	20.5		20.9		27.6	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	28,400		28,300		50,200	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	6.7	J	8.6		9.8	J
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,590		**12,400**		2,110	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	280		1,270		253	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	0.079	J	0.029	J	0.071	J
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	17.9		31.9		20.7	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	948	J	1,400		1,280	J
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	**2.2**	J	0.66	J	**3.3**	J
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	470	J	324	J	658	J
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-	0.5	J	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	24.3		20.3		33.5	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	27.2		50.6		40.8	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	37.6		80.6		30.8	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3						

Location Code:							ASH PIT 3-SB08	
Sample Number:							AP0057A	
Sample Date:							21-Aug-09	
Sample Depth:							3 - 5 Ft	
Sample Purpose:							FS	
Test Group	Parameter	Filtered	Units	2009 RES-RSL	SO-BSC	MDC	Result	ValQual
Explosives	Dinitrotoluene, 2,6-	N	mg/kg	0.71	NE	0.0776	-	-
Semivolatiles	Acenaphthylene	N	mg/kg	NE	NE	0.31	-	-
Semivolatiles	Anthracene	N	mg/kg	1,700	NE	0.231	-	-
Semivolatiles	Benzo(a)anthracene	N	mg/kg	0.15	NE	1.02	-	-
Semivolatiles	Benzo(a)pyrene	N	mg/kg	0.015	NE	0.839	-	-
Semivolatiles	Benzo(b)fluoranthene	N	mg/kg	0.15	NE	1.34	-	-
Semivolatiles	Benzo(ghi)perylene	N	mg/kg	NE	NE	0.0882	-	-
Semivolatiles	Benzo(k)fluoranthene	N	mg/kg	1.5	NE	0.0972	-	-
Semivolatiles	Chrysene	N	mg/kg	15	NE	0.989	-	-
Semivolatiles	Dibenzofuran	N	mg/kg	7.8	NE	0.0757	-	-
Semivolatiles	Fluoranthene	N	mg/kg	230	NE	2.06	-	-
Semivolatiles	Indeno(1,2,3-cd)pyrene	N	mg/kg	0.15	NE	1.95	-	-
Semivolatiles	Methylnaphthalene, 2-	N	mg/kg	31	NE	0.942	-	-
Semivolatiles	Naphthalene	N	mg/kg	3.6	NE	0.764	-	-
Semivolatiles	Phenanthrene	N	mg/kg	NE	NE	0.866	-	-
Semivolatiles	Pyrene	N	mg/kg	170	NE	1.5	-	-
Pesticides/PCBs	Aroclor 1260	N	mg/kg	0.22	NE	0.101	-	-
Metals - Unfiltered	Aluminum	N	mg/kg	7,700	15,500	13000	9,390	
Metals - Unfiltered	Antimony	N	mg/kg	3.1	9.3	1.3	-	-
Metals - Unfiltered	Arsenic	N	mg/kg	0.39	36.5	60.8	35.2	
Metals - Unfiltered	Barium	N	mg/kg	1,500	826	451	93.6	
Metals - Unfiltered	Beryllium	N	mg/kg	16	1	16.5	-	-
Metals - Unfiltered	Cadmium	N	mg/kg	7	NE	7.66	-	-
Metals - Unfiltered	Calcium	N	mg/kg	NE	52,300	54300	14,800	
Metals - Unfiltered	Chromium	N	mg/kg	0.29	29	19.5	17.5	
Metals - Unfiltered	Cobalt	N	mg/kg	2.3	116	62.2	-	-
Metals - Unfiltered	Copper	N	mg/kg	310	56.2	124	29.1	
Metals - Unfiltered	Iron	N	mg/kg	5,500	234,000	90300	38,300	
Metals - Unfiltered	Lead	N	mg/kg	400	48.6	28.8	12.2	
Metals - Unfiltered	Magnesium	N	mg/kg	NE	10,400	20100	1,720	
Metals - Unfiltered	Manganese	N	mg/kg	180	3,506	4470	282	
Metals - Unfiltered	Mercury	N	mg/kg	2.3	0.09	0.383	-	-
Metals - Unfiltered	Nickel	N	mg/kg	150	55.1	43.4	28.5	
Metals - Unfiltered	Potassium	N	mg/kg	NE	3,390	2440	-	-
Metals - Unfiltered	Selenium	N	mg/kg	39	2	3.3	**2.5**	
Metals - Unfiltered	Sodium	N	mg/kg	NE	NE	658	-	-
Metals - Unfiltered	Thallium	N	mg/kg	NE	1.3	3	-	-
Metals - Unfiltered	Vanadium	N	mg/kg	39	40.9	37.6	27.4	
Metals - Unfiltered	Zinc	N	mg/kg	2,300	321.75	92.4	43.3	
Water Quality Parameters	% Solids	N	Percent	NE	NE	82.6	35.9	
Water Quality Parameters	Total organic carbon	N	mg/kg	NE	NE	55.3		

Surfacewater Detected Hits Summary

Location Code:						AP1-SW01		AP1-SW02		AP1-SW03		AP1-SW04	
Sample Number:						AP2007		AP2008		AP2012		AP2013	
Sample Date:						19-May-09		19-May-09		19-May-09		20-May-09	
Sample Depth:						0 - 0 Ft		0 - 0 Ft		0 - 0 Ft		0 - 0 Ft	
Sample Purpose:						REG		REG		REG		REG	
Test Group	Parameter	Filtered	Units	2009 SW-RSL	MDC	Result	ValQual	Result	ValQual	Result	ValQual	Result	ValQual
Metals - Unfiltered	Aluminum	N	ug/L	37,000	8,770	83.8	J	31.8	J	31.9	J	8,770	
Metals - Unfiltered	Arsenic	N	ug/L	0.45	0,8	-	-	-	-	-	-	8.3	J
Metals - Unfiltered	Barium	N	ug/L	7,300	0,80	36.6	J	33.8	J	31.9	J	80	J
Metals - Unfiltered	Calcium	N	ug/L	NE	222,000	145,000		143,000		139,000		222,000	
Metals - Unfiltered	Chromium	N	ug/L	0.43	0,14	-	-	-	-	-	-	13.9	
Metals - Unfiltered	Cobalt	N	ug/L	11	0,7	-	-	-	-	-	-	6.9	J
Metals - Unfiltered	Copper	N	ug/L	1,500	0,19	-	-	-	-	-	-	19.2	J
Metals - Unfiltered	Iron	N	ug/L	26,000	15,100	31.1	J	-	-	26.6	J	15,100	
Metals - Unfiltered	Lead	N	ug/L	15	0,15	2.1	J	-	-	2	J	15	
Metals - Unfiltered	Magnesium	N	ug/L	NE	36,900	26,200		26,600		26,300		36,900	
Metals - Unfiltered	Manganese	N	ug/L	880	0,836	488		396		247		836	
Metals - Unfiltered	Nickel	N	ug/L	730	0,26	-	-	-	-	-	-	26.2	J
Metals - Unfiltered	Potassium	N	ug/L	NE	11,800	2,170	J	2,040	J	2,030	J	11,800	
Metals - Unfiltered	Sodium	N	ug/L	NE	9,140	6,400	J	7,050	J	6,850	J	9,140	J
Metals - Unfiltered	Vanadium	N	ug/L	180	0,20	-	-	-	-	-	-	20	J
Metals - Unfiltered	Zinc	N	ug/L	11,000	0,93	13.2	J	9.6	J	10.8	J	93.2	

APPENDIX J

DATA QUALITY EVALUATIONS

DATA QUALITY EVALUATION

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List of Acronyms

AR/COC	analysis request/chain of custody
CCAL	continuing calibration
CFR	Code of Federal Regulations
CI	chemical investigation
DI	deionized
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
ICAL	initial calibration
ICS	Interference Check Sample
ID	identification
IS	Internal Standard
LCS	laboratory control sample
MB	material blank or method blank
MDL	method detection limit
MQL	method quantitation limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	national functional guidelines
PBOW	Plum Brook Ordnance Works
PQL	practical quanitation limit
QA/QC	quality assurance/quality control
SAP	quality assurance project plan
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
SDG	sample delivery group
SOP	standard operating procedures
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compounds

1.0 Introduction

This appendix presents results of the quality assurance/quality control (QA/QC) measures implemented for the sampling and analysis activities at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The quality indicators from every aspect of the data collection were reviewed, and an assessment of the data with regard to project-specific objectives is presented. Successful execution of project-specific objectives and procedures provides strong support for the acceptance of the data generated as adequate for the purpose of evaluating the analytical results from this assessment at PBOW.

Shaw Environmental, Inc. (Shaw) conducted investigative work at Ash Pit areas 1 and 3 in December 2008, and May, August and November of 2009. Primary and field duplicate project samples collected in December 2008 were analyzed by AML Scientific, LLC of Olathe, Kansas. AML Scientific ceased operations at the end of February 2009. Primary and field duplicate project samples collected after February 2009 were analyzed by Accutest Laboratories, of Orlando, Florida. Field Split samples were submitted to Test America Laboratories, Inc. of North Canton, Ohio for analysis. All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed and submitted were subjected to data validation following guidelines in *Region III Modifications to National Functional Guidelines for Organic Data Review* (September 1994) and *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,* (April 1993). Since these documents specify procedures for Contract Laboratory Program (CLP) data, they are used as guidelines only. Method and laboratory quality assurance and quality control requirements supercede these guidelines, where applicable. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness and comparability goals established to meet the project data quality objectives (DQO). To verify that these DQOs were met, field measurements, sampling and handling procedures, laboratory analysis and reporting, and all nonconformances and discrepancies in the data were examined to determine compliance with the appropriate and applicable procedures defined in the SAP. The results of this review are presented in the following sections, with all analytical outliers or nonconformances discussed where they occurred.

This report is divided into three subsections. Section 2.0 discusses the field investigation and QC procedures used during the sampling effort. Section 3.0 outlines the analytical program and the associated QC activities performed. The final part of this document, Section 4.0, summarizes the data findings and their overall impact on the usability of the analytical data.

2.0 Field Sampling and QC Activities

Shaw was retained by the U. S. Army Corps of Engineers, Nashville District to conduct investigative and sampling activities at Plumbrook. Field activities at this site included collection of soil and groundwater samples. The collection of these samples and their associated QC samples are discussed in this section of the Data Quality Evaluation (DQE).

Fifty two project and five field duplicate soil samples, seven project sediment samples, eight project surface water samples, and twenty-two project and one field duplicate groundwater samples were submitted to AML and Accutest for analysis. Sample shipments from the field were performed under custody and documented using standard Shaw Analysis Request/Chain of Custody (AR/COC) forms. These forms provided project-specific analytical specifications and QC instructions to the laboratory. A formal COC transfer record was prepared and included with these forms to document custody during sample transportation, storage, and disposition by the laboratory. Table 1 summarizes the field sample number, location, sample type, date of collection, lot number, and lab for each sample collected.

2.1 Trip Blanks

Aqueous samples designated for volatile organic compound (VOC) analysis may be susceptible to contamination by diffusion of organic compounds into the sample container. Trip blanks are analyzed in order to assess the potential for contamination to be introduced to an aqueous volatile sample during transport and handling procedures. A trip blank is a sample of analyte free deionized (DI) water that is prepared at the laboratory, shipped to the field with sample containers, and returned to the laboratory with the water matrix samples receiving VOC analysis. A trip blank is then analyzed for volatile organics using the same sample preparation and analysis procedures used for the actual field samples.

The data validator applied the 5X-10X rule to the samples for the analytes detected. The 10X limit is applicable only for common laboratory contaminants such as acetone, methylene chloride, and 2-butanone. No data required qualification due to trip blank contamination.

2.2 Equipment Rinsates

Equipment rinsates are used to assess the effectiveness of the decontamination procedures used by the sampling team on reusable sampling equipment. Three rinsate samples were collected. The following samples were qualified due to contamination detected in equipment rinsates:

SDG Number	Samples Affected	Compounds	Blank Contaminant	Validation Qualifier
F65474	AP1009	Se (Total)	Equipment	B
F69416	AP3074	Acetone	Equipment	B

2.3 Field Duplicates

Field duplicate samples are collected and submitted to the laboratory for analysis along with their corresponding original sample. The data generated from the analysis of field duplicate samples are used to evaluate the precision of the sample collection and analysis procedures. It is difficult to collect and analyze sediment samples in duplicate due to the heterogeneous nature of sediment. High relative percent difference (RPD) between an original sample and its field duplicate may indicate a difference in sample matrix or sample collection rather than true problems with precision of sample analysis. Also, when estimated "J" or nondetected "U" results are reported, there is a potential for increased variability between the primary and duplicate sample results

Field duplicate samples were collected at a frequency of one for every ten samples (10 percent). Six field duplicate samples were collected during this sampling event: five soils and one groundwater. Overall, the field duplicate criteria were met for this project. Additional field duplicates were taken at other sites as the wells in Ash Pit 1 and Ash Pit 3 did not yield enough water for field duplicates and field splits. Table 2 compares the original and field duplicate results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field duplicate samples. Sample sets with no detections are not presented in the table. In cases where duplicates were performed and one result is less than the reporting limit, but greater than the method detection limit, the RPD is reported, but is of limited value. Only samples with detections in both the regular and the duplicate were qualified for high RPDs.

The acceptance criterion of 30 percent RPD for waters and 50 percent RPD for soils was used to evaluate these sample results. The data compared well when detected concentrations were greater than the reporting limit. RPD is calculated by using the following formula:

$$RPD = \left| \frac{A - B}{(A + B)/2} \right| \quad x \quad 100$$

where:

RPD = relative percent difference
A = original result
B = field duplicate result.

2.4 Field Split Samples

Split samples were collected in conjunction with field duplicate samples and sent to Test America Laboratories, Inc. of North Canton. The split samples were submitted to the laboratory for the same analysis as their corresponding field duplicates and original field samples. The split samples are used to determine if data results are reproducible when analyzed by two different laboratories. Results are also evaluated to determine if a contracted laboratory's preparation and analysis procedures are in control and meet the approved method criteria.

Field split samples were collected at a frequency of approximately one for every ten regular samples. Six splits were collected during this sampling event: five soils and one groundwater.

Table 2 compares the original and field split results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field split samples. Samples with no detections are not presented in the table. Samples were not qualified because of sample RPDs.

3.0 Analytical Program and QC Activities

The project QA/QC program described in the SAP was followed for the collection and laboratory analysis of samples. Each of the analytical methods used require that method-specific QA/QC protocols be followed during sample analysis. These protocols are a critical part of the methods employed and were followed by the laboratory during sample analysis. Specific measures included detailed record keeping procedures, instrument calibrations, and analysis of method blanks, blank spikes, MS/MSD, surrogates, and internal standards. The following methods were used to analyze Plumbrook samples:

Analysis	Method
Semivolatiles	SW-846 8270C
Nitroaromatics	SW-846 8330
Volatiles	SW-846 8260B
Metals	SW-846 6010B/7470A

Analysis	Method
Polychlorinated Biphenyls	SW-846 8082
Wet Chemistry	MCAWW 300.0A (Chloride, Sulfate and Nitrate as N), MCAWW 310.1 (Alkalinity), MCAWW 180.1 (Turbidity), MCAWW 160.1 (TDS), MCAWW 160.2 (TSS), MCAWW 130.2 (Hardness), SW846 9012A (Cyanide), TOC by Walkley Black (Total Organic Carbon)

The validator used the QA/QC criteria defined in the SAP, laboratory-derived acceptance criteria, and analytical method criteria to qualify data. Any qualifiers added to these data by the data validator are included in the data summary report.

3.1 Laboratory QA/QC Procedures

The following sections discuss specific QA/QC protocols required and performed by the laboratory during this investigation.

3.1.1 Calibration

The calibration of instruments is required to ensure that the instruments are operating properly. Calibration is achieved when instrument response can be related to the concentration of an analyte. Several analytes were qualified because of unacceptable performance in the initial and continuing calibration standards. The following analytes exhibited initial calibration individual relative response factors <0.1. These analytes are qualified as follows:

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
F65208	AP3052	Acetone	R
F65209	AP3051, AP3053, AP3054	Acetone	J/R
F69338	AP3070	Acetone	R
F69416	AP3074	Acetone	B

The table below lists the analytes that exhibited individual ICAL percent relative standard deviation and/or CCAL percent difference outside QC criteria. The criteria used to evaluate the data are: individual ICAL percent relative standard deviation > 30% and/or CCAL percent difference > 20% (volatile and semivolatile organics); >15% (explosives); for metals, individual ICAL/CCAL percent relative standard deviation > 10%; and for mercury, individual ICAL/CCAL percent relative standard deviation > 20%.

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0003, AP0006, AP0018, AP0019, AP0028, AP0058	Benzoic Acid, 2,4-Dinitrophenol, n-Nitrosodimethylaminie	UJ
	AP0001	Fluoranthene, Pyrene	QJ
	AP0026	Dibenzofuran, 2-Methylnaphthalene	
	AP0004, AP0026	2-Nitrotoluene	UJ
0812033	AP0007, AP0008, AP0013, AP0014, AP0016, AP0025	Benzoic Acid, 2,4-Dinitrophenol, n-Nitrosodimehtylamine	UJ
	AP0009	4-Chloroaniline, 3,3'-Dichlorobenzidine, Hexachlorocyclopentadiene	UJ
0812042	AP3000, AP3001	2,4-Dinitrophenol	UJ
0812046	AP3003, AP3004, WW3005	Benzoic Acid, 4-Chloroaniline	UJ
F65209	AP3051, AP3053, AP3054	Chloroethane	UJ
	AP3053, AP3054	Bromoform, Styrene, Methylene Chloride	UJ/B
F65474	AP1009	2,4-Dinitrophenol	UJ
F67482	AP0040	Hexachlorocyclopendadiene	UJ
A8L170228	WW3013	Hexachlorocyclopentadiene	UJ

In addition, during the validation process, the Shaw Validation group identified a problem with SVOC constituents calculated by linear regression. The linearity passed calibration criteria but the curve is shifted to the right which leads to a large negative Y intercept. Several SVOC results are biased high due to this issue. The laboratory should have reported results calculated from instrument responses less than 20% below that of the low standard as non-detect per the method. However, this was not done. AML was in the process of bankruptcy and non-responsive to this issue at the time it was noted. This issue was brought to the attention of the Nashville USACE and the decision was made to manually recalculate any SVOCs results calculated by linear regression that were above an action level.

3.1.2 Method/Calibration Blanks

Method blanks are analyzed with each analytical "batch" processed on a per matrix (i.e., soil and water) basis. Method blanks are carried step-wise through the same analytical procedure as their associated field samples including the addition of solvents, surrogate and standard spikes, and reagents as required in the analysis process. The purpose of a method blank is to identify any contaminants that may be introduced to the sample as a result of the analytical process. The data validator evaluated all blank data associated with each sample. The following analytes were qualified because of detections in the method or calibration blanks.

SDG Number	Samples Affected	Analytes	Blank Contaminant	Validation Qualifier

F65209	AP3053, AP3054	Methylene Chloride	Method	B
F69338	AP3070, AP3071, AP3072	Pb (Total)		
	AP3070, AP3072, AP3073	Zn (Total)		

3.1.3 Surrogate Recoveries

Surrogate standards are defined as non-target compounds added to standards, blanks, and samples prior to extraction or purging. They are used in organic analyses to monitor the percent recovery efficiencies of the sample preparation and analytical procedures. The following samples were qualified due to surrogate recoveries that fell outside QC limits:

SDG Number	Samples Affected	Analyte(s) Qualified	Validation Qualifier
0812032	AP0001, AP0003, AP0004, AP0005, AP0006, AP0017, AP0019, AP0026, AP0027, AP0058	All analytes in sample	UJ
0812033	AP0007, AP0009, AP0010, AP0014, AP0023, AP0024, AP0063	All analytes in sample	UJ
	AP0023	Aroclor-1260	J
F65209	AP3054	All analytes in sample	UJ
F65381	AP2013	All analytes in sample	UJ
F65472	AP2009	All analytes in sample	UJ
F69338	AP3073	All analytes in sample	UJ
F69416	AP3074	All analytes in sample	UJ

3.1.4 Matrix Spikes and Laboratory Control Spikes

Two types of spikes were performed for all analyses: matrix spikes (MS) and laboratory control samples (LCS). MS compounds are spiked into an aliquot of a field sample. LCS compounds are spiked into a blank matrix. The spiked compounds are representative compounds that are quantified during performance of the method. Recovery of the spiked compound is used as an assessment of analytical accuracy for the sample matrix analyzed. These results are useful in distinguishing sample matrix interferences from analysis interferences through a comparison of MS and LCS recovery data. Often, spikes are performed in duplicate as a matrix spike duplicate (MSD) or LCS duplicate. In this manner, the precision of the assessment can be quantified as the RPD of the original and duplicate spike.

Matrix spikes were assigned at a frequency of at least 1 for every 20 field samples collected. Twenty-two MS/MSD pairs were assigned to samples. Locations with MS/MSD samples are

provided in Table 1. The number of MS/MSDs assign greatly exceeds the required collection frequency. Additional sample volume was provided to the laboratory for the MS/MSD analyses assigned in the field. This sampling frequency exceeds the collection criteria for this program as specified in the SAP. Several of the LBA sample were selected by the laboratory for MS/MSDs for batch QC. In addition to the overall collection frequency, the analytical method requires that the laboratory analyze 1 set of spikes per analytical batch. To comply with this method requirement, the laboratory may analyze additional MS/MSD pairs. The validator evaluated all batch QC. The laboratory's statistically determined target acceptance limits were used to assess the spike recovery and RPD. The following MS/MSD recoveries are outside of established QC criteria:

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
0812032	AP0001, AP0002, AP0003, AP0004, AP0005, AP0006, AP0017, AP0018, AP0019, AP0026, AP0027, AP0028, AP0058	(Total) Sb, As, Ba, Se	J/UJ
	AP0028	4-Amino-2,6-dinitrotoluene, Tetryl, 2-Amino-4,6-dinitrotoluene, Nitrobenzene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, 2,6- Dinitrotoluene2-Nitrotoluene, 3-Nitrotoluene, 4-Nitrotoluene, 1,3,5-Trinitrobenzene, 2,4,6-Trinitrotoluene	UJ/R
0812033	AP0024	4-Chloroaniline, 3,3'-Dichlorobenzidine, 3-Nitroaniline, 4-Nitroaniline	UJ
	AP0024	(Total) Al, Sb*, As*, Ca, Se, Ag, Tl	J/UJ
F65209	AP3053	Acetone, trans-1,3-Dichloropropene	J/UJ
F65474	AP1009	(Total) Sb, Mn	J
F67482	AP0040	3,3'-Dichlorobenzidine*, 2,4-Dinitrophenol, Hexachlorocyclopentadiene	UJ
	AP0032, AP0033, AP0036, AP0037, AP0039, AP0040	(Total) Al, Sb, Ca, Mn, Ag, Zn	J/UJ
F69338	AP3070, AP3071, AP3073	Nitrate-Nitrite, Sulfate	J/UJ
F69416	AP3074	Se (Total and Filtered)	J
	AP3074	Chloride, Nitrate-Nitrite	J
A9H220159	AP0060	Pentachlorophenol	UJ

*Analytes were qualified for %RPD outside QC limits for the MS/MSD analysis.

LCS results are used to evaluate lab method performance in the same manner as the MS/MSD results except the LCS is not performed on an actual field sample matrix. The LCS is prepared for each analytical batch and for each parameter and matrix analyzed. LCS recoveries met QC criteria with the following exception(s):

SDG Number	Samples Affected	Compound(s)	Validation Qualifier
0812033	AP0007, AP0008, AP0009, AP0010, AP0011, AP0012, AP0013, AP0014, AP0015, AP0016, AP0023, AP0024, AP0025, AP0063	4-Chloroaniline*, 3,3'-Dichlorobenzidine*, 3-Nitroaniline*	UJ
	AP0010, AP0011, AP0012, AP0015, AP0023, AP0024, AP0063	Benzyl Alcohol, 4-Nitroaniline	UJ
F65209	AP3053, AP3054	Styrene	UJ

*Analyte qualified for %RPD outside QC limits for the LCS/LCSD analysis.

3.1.5 Laboratory Duplicate Sample Analysis

Laboratory Duplicate determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate Sample analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. Laboratory duplicate analysis was performed for the project samples, and all QC criteria were met with the following exception(s):

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F65208	AP3052	(Total) Al	J
F65474	AP1009	(Total) Cd	J
F69338	AP3071, AP3072	(Total) Se	B/J
	AP3070, AP3071, AP3072	(Total) Lead	

3.1.6 Internal Standards

Internal standards (IS) performance criteria ensures the GC/MS sensitivity and response are stable during each analysis. Internal standard area counts must not vary by more than a factor of two (-50 percent to +100 percent) from the associated 12 hour calibration standard. The retention time of the internal standard must not vary more than +30 seconds from the retention time of the associated 12 hour calibration standard. All internal standards met QC criteria.

3.1.7 Column Agreement

For high performance liquid chromatography (HPLC) analyses, sample results are confirmed using two dissimilar columns. In order for an analyte to be reported, it must be detected on both columns. Results differing by greater than 40 percent are qualified estimated, "J". All detections were in agreement.

3.1.8 Interference Check Sample

The ICP Interference Check Sample (ICS) verifies the contract laboratory's interelement and

background correction factors. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and solution AB consists of the analytes mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with solution A, for all wavelengths used for each analyte reported by ICP. Results for the ICP analysis of the ICS solution AB must fall within the control limits of ± 20% of the true value for the analytes included in the solution. All Interference Check Sample (ICS) percent recoveries were acceptable.

3.1.9 Inductively Coupled Plasma Serial Dilutions

The ICP serial dilution analysis is performed to determine whether or not significant physical or chemical interferences exist due to sample matrix. All QC criteria were met for the serial dilutions associated with the project samples, with the following exception(s):

SDG	Samples Affected	Compound(s)	Validation Qualifier
0812032	AP0001, AP0002, AP0003, AP0004, AP0005, AP0006, AP0017, AP0018, AP0019, AP0027, AP0026, AP0028, AP0058	(Total) Al, Be, Cu	J
	AP0001, AP0002, AP0003, AP0004, AP0005, AP0017, AP0018, AP0019, AP0026, AP0027, AP0028, AP0058	(Total) K, V	J
	AP0001, AP0002, AP0003, AP0005, AP0006, AP0018, AP0019, AP0027, AP0028, AP0058,	(Total) Ni	J
0812033	AP0007, AP0008, AP0009, AP0010, AP0011, AP0012, AP0013, AP0014, AP0015, AP0016, AP0023, AP0024, AP0025, AP0063	(Total) Be, V	J
F65208	AP3052	(Total) Al	J
F65474	AP1009	(Total) Mn, Ca, Co, Fe, Mg, Ni, Zn	J
F67482	AP0032, AP0033, AP0036, AP0037, AP0039, AP0040	(Total) Ca, Mn, Cr, Co, Fe, Mg, K	J
F69416	AP3074	(Total) Fe, K (Filtered) K	J

3.2 Reporting Limits

Limits have been established to describe project sensitivity requirements. Each laboratory is required to demonstrate method performance through method detection limit (MDL) studies for every method employed. These studies are required to be laboratory-specific so that individual laboratory variables such as equipment brands, reagent suppliers, and chemist technique are

factored into the performance study. MDLs are established using controlled matrices (i.e., DI water). Practical quantitation limits (PQL) or method quantitation limits (MQL), used for this project are those statistically determined by the laboratories. The analytical program executed for this project required the use of SW-846 methods, which specify the procedure for calculating the MDLs. The PQL/MQL calculation adjusts the limit by a predetermined mathematical factor for the analysis of actual environmental sample matrices (i.e. soil, groundwater, etc.). Method reporting limits (MRL) are based on the project action or decision levels.

These limits are generally defined as follows:

- ***MDL.*** The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the concentration is greater than zero.

- ***MQL/PQL.*** The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. It is set at the lowest standard used for the calibration curve.

- ***MRL.*** A threshold value below which the laboratory reports a result as non-detected. Ideally, the MRL will be established anywhere between the MDL and 1/2 the project action levels.

An MDL is the lower limit at which the laboratory can differentiate a measurement from background. The MDL is determined in accordance with the procedures in 40 CFR Part 136. If project action levels are near or below the MDL, it is unlikely the sensitivity of the method will be achievable. A compromise must be reached. The PQL/MQL is the lower limit at which a measurement becomes meaningful. This measurement (the PQL or the RL) is generally a multiple of three to five times the MDL.

Most samples were handled and analyzed as expected without significant changes to the anticipated project MQLs. Thirteen samples had elevated MQLs due to dilutions.

3.3 Holding Times/Preservation

Samples need to be extracted and analyzed within the recommended holding times for the results to be considered reflective of native concentrations as collected. Analytical data generated outside of the recommended holding times should typically be considered as minimum values only. Also, samples that contain analytes that are subject to biological degradation prior to analysis need to be preserved in order to preserve the integrity of the sample.

All laboratory results submitted for this investigation have been reviewed with respect to laboratory adherence to extraction and analysis holding times. Maximum sample extraction and

analysis hold times were those specified in USACE document EM200-1-3. All results were acceptable with the following exception(s):

Holding Times
Technical holding time criteria were met for all samples, with the following exception(s):

SDG Number	Samples Affected	Analysis	Validation Qualifier
0812032	AP0004, AP0026	Explosives	UJ
	AP0001	TOC	J
F65191	AP3050	Total Cyanide	UJ
F65208	AP3052	Total Cyanide	UJ
F65209	AP3051, AP3053, AP3054	Turbidity, Total Cyanide	J/UJ
F69416	AP3074	Turbidity	J

Sample Preservation
Sample preservation criteria were met for all samples.

4.0 Data Evaluation and Usability

The analytical data review process identified a few analytical nonconformance issues that were noted during this analytical program. These anomalies have been discussed in the previous sections of this appendix. Table 3 summarizes all compounds requiring qualifier application due to anomalies discovered during data validation. Table 4 defines the reason codes for qualification and Table 5 defines the data validation qualifiers.

The following definitions are used for defining precision, accuracy, representativeness, completeness, and comparability as they have been applied to this evaluation.

Precision. Precision is a measurement of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision data were obtained through the analysis and evaluation of duplicate QA samples. Accuracy was determined through the analysis and evaluation of method blanks, LCSs, trip blanks, equipment rinsates, and MS samples.

Accuracy. Accuracy is a measurement of bias in a system and is expressed as a percent recovery. These QA samples were collected and/or analyzed at the frequency established in the

SAP, verifying the completeness element of the DQOs along with the evaluation of holding times and reporting limits. Percent recovery is calculated as follows:

$$Percent\ \mathrm{Recov}ery = \left(\frac{(x-s)}{T}\right) * 100$$

Where:

X = the lab determined concentration of a spiked sample
S = the sample native concentration prior to spike
T = the true concentration of the spike

Relative Percent Difference is calculated as follows:

$$\mathrm{Re}lative\ Percent\ Difference = \left[\frac{|D1 - D2|}{\frac{D1 + D2}{2}}\right] * 100$$

Where:

D1 and D2 = the results of duplicate measurements

Representativeness. Representativeness is a qualitative parameter that expresses the degree to which sample data actually represent the matrix and site conditions. For example, in conducting ground water monitoring, representativeness requires proper location of wells and the collection of samples under consistent, documented procedures. Wells are located based upon the results of the hydrological study in progress and are designed to provide maximum coverage of the flow conditions. Requirements and procedures for sample collection and handling are designed to maximize sample representativeness. Representativeness also can be monitored by reviewing field documentation and by performing field audits.

The samples were collected using Shaw SOPs and were fully documented through the use of standard Shaw field forms. Samples are representative of the matrix and site sampled.

Completeness. Completeness is a measure of the amount of valid data that are obtained during a sampling event as compared to the amount of data planned to be collected under optimum conditions. Some data for this project were qualified as estimated in the validation process because of the outliers noted in the MS recoveries, duplicate results for certain elements,

and various other calibration and column confirmation percent difference results. Completeness is calculated as follows:

$$Completeness\ \% = \left(\frac{D_r}{D_c}\right) X\ 100$$

Where:

D_r = the number of data points for which valid results are reported

D_c = the number of valid samples/data points that are collected and reach the laboratory for analysis.

During this task, 65 regular project samples were collected resulting in approximately 12,594 targeted analytical records. 84 results were rejected. Using the above calculation, 99.3% completeness was achieved for the task.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability ensures that results for the sampling event can be compared with data from other past and/or future sampling programs. Comparability for this sampling event was achieved through the use of established and recognized techniques and accepted standard EPA methods. All samples collected and analyzed were subjected to the same sampling, handling, preparation, analysis, reporting, and validation criteria for the purpose of achieving comparability goals within the data set.

4.1 Statement of Data Usability

The overall results of the analyses, as discussed in this evaluation, suggest that representative samples were collected and analyzed, and the results are indicative of the media analyzed, with the exception of the few anomalies noted. The data do reflect expected site conditions and are usable for their intended purpose.

Tables 1 through 5 summarize the analytical program and the results for the data validation effort for all samples collected by Shaw at Plumbrook.

Table 1
Sample Cross-reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Sample Delivery Group
SS	ASH PIT 1-SB01	AP0001	12/08/2008	REG	0812032
DS	ASH PIT 1-SB01	AP0002	12/08/2008	REG	0812032
DS	ASH PIT 1-SB01	AP0003	12/08/2008	REG	0812032
SS	ASH PIT 1-SB02	AP0004	12/08/2008	REG	0812032
DS	ASH PIT 1-SB02	AP0005	12/08/2008	REG	0812032
DS	ASH PIT 1-SB02	AP0006	12/08/2008	REG	0812032
SS	ASH PIT 1-SB03	AP0007	12/09/2008	REG	0812033
DS	ASH PIT 1-SB03	AP0008	12/09/2008	REG	0812033
DS	ASH PIT 1-SB03	AP0009	12/09/2008	REG	0812033
SS	ASH PIT 1-SB04	AP0010	12/09/2008	REG	0812033
DS	ASH PIT 1-SB04	AP0011	12/09/2008	REG	0812033
DS	ASH PIT 1-SB04	AP0012	12/09/2008	FD	0812033
DS	ASH PIT 1-SB04	AP0012MS	12/09/2008	MS	0812033
DS	ASH PIT 1-SB04	AP0012MSD	12/09/2008	MSD	0812033
DS	ASH PIT 1-SB04	AP0013	12/09/2008	REG	0812033
SS	ASH PIT 1-SB05	AP0014	12/09/2008	REG	0812033
DS	ASH PIT 1-SB05	AP0015	12/09/2008	REG	0812033
DS	ASH PIT 1-SB05	AP0016	12/09/2008	REG	0812033
SS	ASH PIT 1-SB06	AP0017	12/08/2008	REG	0812032
DS	ASH PIT 1-SB06	AP0018	12/08/2008	REG	0812032
DS	ASH PIT 1-SB06	AP0019	12/08/2008	REG	0812032
SS	ASH PIT 1-SB08	AP0023	12/09/2008	REG	0812033
DS	ASH PIT 1-SB08	AP0024	12/09/2008	REG	0812033
SS	ASH PIT 1-SB08	AP0024MS	12/09/2008	MS	0812033
SS	ASH PIT 1-SB08	AP0024MSD	12/09/2008	MSD	0812033
DS	ASH PIT 1-SB08	AP0025	12/09/2008	REG	0812033
SS	ASH PIT 1-SB09	AP0026	12/08/2008	REG	0812032
DS	ASH PIT 1-SB09	AP0027	12/08/2008	REG	0812033
DS	ASH PIT 1-SB09	AP0027MS	12/08/2008	MS	0812033
DS	ASH PIT 1-SB09	AP0027MSD	12/08/2008	MSD	0812033
DS	ASH PIT 1-SB09	AP0028	12/08/2008	REG	0812032
DS	ASH PIT 1-SB09	AP0028MS	12/08/2008	MS	0812032
DS	ASH PIT 1-SB09	AP0028MSD	12/08/2008	MSD	0812032
SS	ASH PIT 3-SB01	AP0032	08/19/2009	REG	F67482
DS	ASH PIT 3-SB01	AP0033	08/19/2009	REG	F67482
SS	ASH PIT 3-SB02	AP0036	08/19/2009	REG	F67482
DS	ASH PIT 3-SB02	AP0037	08/19/2009	REG	F67482
SS	ASH PIT 3-SB03	AP0039	08/19/2009	REG	F67482
DS	ASH PIT 3-SB03	AP0040	08/19/2009	REG	F67482
DS	ASH PIT 3-SB03	AP0040-MS	08/19/2009	MS	F67482
DS	ASH PIT 3-SB03	AP0040-MSD	08/19/2009	MS	F67482
SS	ASH PIT 3-SB04	AP0042	08/21/2009	REG	F67519
DS	ASH PIT 3-SB04	AP0043	08/21/2009	REG	F67519
SS	ASH PIT 3-SB05	AP0045	08/21/2009	REG	F67519
DS	ASH PIT 3-SB05	AP0046	08/21/2009	REG	F67519
SS	ASH PIT 3-SB06	AP0048	08/20/2009	REG	F67519
DS	ASH PIT 3-SB06	AP0049	01/26/2010	REG	F67519
SS	ASH PIT 3-SB07	AP0051	08/21/2009	REG	F67519
DS	ASH PIT 3-SB07	AP0052	08/21/2009	REG	F67519

Table 1
Sample Cross-reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	Sample Delivery Group
SS	ASH PIT 3-SB08	AP0054	08/21/2009	REG	F67519
DS	ASH PIT 3-SB08	AP0055	08/21/2009	REG	F67519
DS	ASH PIT 3-SB08	AP0056	08/21/2009	FD	F67519
DS	ASH PIT 3-SB08	AP0057	08/21/2009	FS	A9H220159
DS	ASH PIT 1-SB09	AP0058	12/08/2008	FD	F67519
DS	ASH PIT 3-SB07	AP0059	08/24/2000	FD	F67519
DS	ASH PIT 3-SB07	AP0060	08/21/2009	FS	A9H220159
DS	ASH PIT 1-SB09	AP0061	12/08/2008	FS	A8L130179
DS	ASH PIT 3-SB06	AP0061A	08/20/2009	REG	F67519
DS	ASH PIT 1-SB04	AP0062	12/09/2008	FS	A8L130179
SS	ASH PIT 1-SB08	AP0063	12/09/2008	FD	F67519
SD	AP1-SD01	AP1007	05/19/2009	REG	F65380
SD	AP1-SD02	AP1008	05/19/2009	REG	F65380
SD	AP3-SD01	AP1009	05/23/2009	REG	F65474
SD	AP3-SD02	AP1010	05/23/2009	REG	F65474
SD	AP3-SD03	AP1011	05/23/2009	REG	F65474
SD	AP1-SD03	AP1012	05/19/2009	REG	F65374
SD	AP1-SD04	AP1013	05/20/2009	REG	F65374
SW	AP1-SW01	AP2007	05/19/2009	REG	F65381
SW	AP1-SW02	AP2008	05/19/2009	REG	F65373
SW	AP3-SW01	AP2009	05/23/2009	REG	F65472
SW	AP3-SW02	AP2010	05/23/2009	REG	F65472
SW	AP3-SW03	AP2011	05/23/2009	REG	F65472
SW	AP1-SW03	AP2012	05/19/2009	REG	F65373
SW	AP1-SW04	AP2013	05/20/2009	REG	F65380
GW	ASH PIT 1-PZ01	AP3000	12/12/2008	REG	0812042
GW	ASH PIT 1-PZ02	AP3001	12/11/2008	REG	0812042
GW	ASH PIT 1-PZ02	AP3001DUP-LR	12/11/2008	LR	0812042
GW	ASH PIT 1-PZ02	AP3001MS	12/11/2008	MS	0812042
GW	ASH PIT 1-PZ02	AP3001MSD	12/11/2008	MSD	0812042
GW	ASH PIT 1-PZ04	AP3003	12/15/2008	REG	0812046

Table 2
Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Location:			**ASH PIT 1-PZ04**		**ASH PIT 1-PZ04**		**ASH PIT 1-PZ04**		
Sample Number:			**AP3003**		**WW3005**		**WW3013**		
Sample Date:			**15-Dec-08**		**15-Dec-08**		**15-Dec-08**	**Relative**	**Relative**
Sample Depth:			**20 - 20 Ft**		**20 - 20 Ft**		**20 - 20 Ft**	**Percent**	**Percent**
Sample Type:			**GW**		**GW**		**GW**	**Difference**	**Difference**
Sample Purpose:			**REG**		**FD**		**FS**	**REG and FD**	**REG and FS**

All sample results non-detect.

Sample Location:			**ASH PIT 1-SB04**		**ASH PIT 1-SB04**		**ASH PIT 1-SB04**			
Sample Number:			**AP0011**		**AP0012**		**AP0062**			
Sample Date:			**9-Dec-08**		**9-Dec-08**		**9-Dec-08**		**Relative**	**Relative**
Sample Depth:			**3 - 4 Ft**		**3 - 4 Ft**		**3 - 4 Ft**		**Percent**	**Percent**
Sample Type:			**DS**		**DS**		**DS**		**Difference**	**Difference**
Sample Purpose:			**REG**		**FD**		**FS**		**REG and FD**	**REG and FS**
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Aluminum	N	mg/kg	7,340		6,910		6,680		6.04	9.42
Arsenic	N	mg/kg	3.72		3.42		6.2		8.40	50.00
Barium	N	mg/kg	52.8		132		42.8		**85.71**	20.92
Beryllium	N	mg/kg	6.43	J	8.18	J	-	-	23.96	-
Cadmium	N	mg/kg	0.25	J	0.313	J	-	-	22.38	-
Calcium	N	mg/kg	2,570		2,790		2,300		8.21	11.09
Chromium	N	mg/kg	11.7		11.5		11		1.72	6.17
Cobalt	N	mg/kg	26.8		28.9		27.4		7.54	2.21
Copper	N	mg/kg	9.5		11.3		7.9		17.31	18.39
Iron	N	mg/kg	18,700		27,400		21,900		37.74	15.76
Lead	N	mg/kg	7.25		8.13		6.8		11.44	6.41
Magnesium	N	mg/kg	1,150		1,020		1,140		11.98	0.87
Manganese	N	mg/kg	871		1,240		556		34.96	44.15
Mercury	N	mg/kg	0.0305		0.0301		-	-	1.32	-
Nickel	N	mg/kg	14.4		8.92		27.9		47.00	**63.83**
Potassium	N	mg/kg	298		281		-	-	5.87	-
Sodium	N	mg/kg	26		24		-	-	8.00	-
Vanadium	N	mg/kg	22	J	26.1	J	20.5		17.05	7.06
Zinc	N	mg/kg	63.4		75.1		60.7		16.90	4.35

Sample Location:			**ASH PIT 3-SB07**		**ASH PIT 3-SB07**		**ASH PIT 3-SB07**			
Sample Number:			**AP0052**		**AP0059**		**AP0060**			
Sample Date:			**21-Aug-09**		**21-Aug-09**		**21-Aug-09**		**Relative**	**Relative**
Sample Depth:			**3 - 5 Ft**		**3 - 5 Ft**		**3 - 5 Ft**		**Percent**	**Percent**
Sample Type:			**DS**		**DS**		**DS**		**Difference**	**Difference**
Sample Purpose:			**REG**		**FD**		**FS**		**REG and FD**	**REG and FS**
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Aluminum	N	mg/kg	9,910		9,620		8,630		2.97	13.81
Arsenic	N	mg/kg	9.3		6.9		7		29.63	28.22
Barium	N	mg/kg	70.5		70.1		77.2		0.57	9.07
Beryllium	N	mg/kg	0.67		0.63		-	-	6.15	-
Cadmium	N	mg/kg	0.21	J	0.19	J	-	-	10.00	-
Calcium	N	mg/kg	42,400		47,800		54,300		11.97	24.61
Chromium	N	mg/kg	15		14.5		14.8		3.39	1.34
Cobalt	N	mg/kg	8.1		7.3		8.4		10.39	3.64
Copper	N	mg/kg	21.7		19.4		15.4		11.19	33.96
Iron	N	mg/kg	17,700		14,900		17,500		17.18	1.14
Lead	N	mg/kg	11.9	J	11.2	J	9.5		6.06	22.43
Magnesium	N	mg/kg	15,800		17,500		19,400		10.21	20.45
Manganese	N	mg/kg	477		460		498		3.63	4.31
Mercury	N	mg/kg	0.026	J	0.022	J	-	-	16.67	-
Nickel	N	mg/kg	22.7		21.4		20.5		5.90	10.19
Potassium	N	mg/kg	2,110		2,110		1,770		0.00	17.53

Table 2
Summary of Original, Field Duplicate, and Field Split Hits with Realtive Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

Selenium	N	mg/kg	0.9	J	0.98	J	-	-	8.51	-
Sodium	N	mg/kg	269	J	280	J	-	-	4.01	-
Vanadium	N	mg/kg	21.9		21.1		19.7		3.72	10.58
Zinc	N	mg/kg	53.2		49.5		59.3		7.21	10.84
Sample Location:			**ASH PIT 3-SB08**		**ASH PIT 3-SB08**		**ASH PIT 3-SB08**			
Sample Number:			**AP0055**		**AP0056**		**AP0057A**			
Sample Date:			**21-Aug-09**		**21-Aug-09**		**21-Aug-09**		**Relative**	**Relative**
Sample Depth:			**3 - 5 Ft**		**3 - 5 Ft**		**3 - 5 Ft**		**Percent**	**Percent**

Table 3
Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Table 4
Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Former Plum Brook Ordnance Works
Sandusky, Ohio

Footnotes:
(1) Table 3 defines all reason codes.
(2) Reason codes are assigned in order of their importance to the validation qualifiers applied. R1 is the most important

Definitions:
VQ = validation qualifier

Table 5
Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B (metals)	The analyte was detected; the concentration is below the reporting limit.
B (organics)	Indicates analyte is found in associated method blank.
J (metals)	The compound was detected in the blank.
J (organics)	The compound was positively identified; the reported value is below the reporting limit.
U	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
E	Indicates that the result is above the maximum calibration range.
N	Indicates presumptive evidence of a compound.
P	RPD > 40% between the primary and confirmation column results for dual column chromatographic method (e.g. GC and HPLC methods).
*	Exceeds QC limit.
Q1	The %D or %Drift for the associated CCV is outside the method QC limit.
ME	Marginal Exceedence of the 3-sigma QC limits.
ME*	Exceedence of the 4-sigma QC limits.
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

APPENDIX K

CHAINS-OF-CUSTODY

0812032

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 09 08AML

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/9/08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531932794 39

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP 0001	SOIL	12-8-08 1125	Wide Mouth Glass Jar	9 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-01				4 oz	Cool	TOC by Walkley-Black		
	SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				2 oz	Cool	TOC by Walkley-Black		
			HRY 12/9/08					

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler	Date: 12/9/08 Time: 1800	1. Received by:	Date: 12/10/08 Time: ~~4pm~~ 11am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0812032

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 09 08AML

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/9/08
Laboratory Destination: AMI
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8531 9327 9439

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
	~~AP 0001~~	~~SOIL~~	~~12-8-08 1125~~	~~Wide Mouth Glass Jar~~	~~9 oz EW~~	~~Cool~~	~~Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082~~		
812032-02	AP 0002	SOIL	12-8-08 1128	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-03	AP 0004	SOIL	12-8-08 1330	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-04	AP 0005	SOIL	12-8-08 1333	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-05	AP 0026	SOIL	12-8-08 1405	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-06	AP 0027	SOIL	12-8-08 1410	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-07	AP 0017	SOIL	12-8-08 1550	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
812032-08	AP 0018	SOIL	12-8-08 1553	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: David Kessler Date: 12/9/08 Time: 1800
1. Received by: Date: 12/10/08 Time: 1100 pm
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

812032

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 09 08AML

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PROW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/9/08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-620-3211
Carrier Waybill No.: 8531 9327 9439

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
812032-09	AP0003	SOIL	12-8-08 1130	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-10	AP0006	SOIL	12-8-08 1335	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-11	AP0019	SOIL	12-8-08 1554	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-12	AP0028	SOIL	12-8-08 1415	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-12	AP0028 MS	SOIL	12-8-08 1415	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-12	AP0028 MSD	SOIL	12-8-08 1415	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
812032-13	AP0058	SOIL	12-8-08 1415	Wide Mouth Glass Jar	9 oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: David Kessler — Date: 12/9/08 Time: 1800
2. Relinquished by: — Date: Time:
3. Relinquished by: — Date: Time:

1. Received by: — Date: 12/10/08 Time: 11am.
2. Received by: — Date: Time:
2. Received by: — Date: Time:

Comments:

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812032	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/24/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	Metals, Hg by 7471A	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	PCBs by 8082	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	SVOCs, BNA by 8270C	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	Solids, Dry Weight by % Solids	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	Metals by 6020A	TAL Metals
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	TOC by 9060	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	Explosives by 8330A/8332	
0812032-01	Soil	AP0001	12/08/08 11:25	12/22/08	Metals by 6010B	TAL Metals
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	Explosives by 8330A/8332	
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	Metals, Hg by 7471A	
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	Metals by 6010B	TAL Metals
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	SVOCs, BNA by 8270C	
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	PCBs by 8082	
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	Solids, Dry Weight by % Solids	
0812032-02	Soil	AP0002	12/08/08 11:28	12/22/08	Metals by 6020A	TAL Metals
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	Explosives by 8330A/8332	
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	Solids, Dry Weight by % Solids	
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	SVOCs, BNA by 8270C	
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	Metals by 6010B	TAL Metals
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	Metals by 6020A	TAL Metals
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	Metals, Hg by 7471A	
0812032-03	Soil	AP0004	12/08/08 13:30	12/22/08	PCBs by 8082	

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812032	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/24/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	Metals, Hg by 7471A	
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	Solids, Dry Weight by % Solids	
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	PCBs by 8082	
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	Metals by 6010B	TAL Metals
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	Explosives by 8330A/8332	
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	Metals by 6020A	TAL Metals
0812032-04	Soil	AP0005	12/08/08 13:33	12/22/08	SVOCs, BNA by 8270C	
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	PCBs by 8082	
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	Explosives by 8330A/8332	
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	Metals by 6010B	TAL Metals
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	SVOCs, BNA by 8270C	
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	Metals by 6020A	TAL Metals
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	Solids, Dry Weight by % Solids	
0812032-05	Soil	AP0026	12/08/08 14:05	12/22/08	Metals, Hg by 7471A	
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	PCBs by 8082	
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	Metals, Hg by 7471A	
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	SVOCs, BNA by 8270C	
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	Metals by 6020A	TAL Metals
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	Explosives by 8330A/8332	
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	Metals by 6010B	TAL Metals
0812032-06	Soil	AP0027	12/08/08 14:10	12/22/08	Solids, Dry Weight by % Solids	

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number 0812032 **Client AML ID** Shaw E&I, Inc **Report Lvl.** 3

Work Order Due Date 12/24/08 **Client Project ID** PBOW

Work Order TAT 14

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	Metals by 6010B	TAL Metals
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	Metals, Hg by 7471A	
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	Explosives by 8330A/8332	
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	PCBs by 8082	
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	Solids, Dry Weight by % Solids	
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	Metals by 6020A	TAL Metals
0812032-07	Soil	AP0017	12/08/08 15:50	12/22/08	SVOCs, BNA by 8270C	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	Explosives by 8330A/8332	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	Metals by 6020A	TAL Metals
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	SVOCs, BNA by 8270C	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	Metals, Hg by 7471A	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	Solids, Dry Weight by % Solids	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	PCBs by 8082	
0812032-08	Soil	AP0018	12/08/08 15:53	12/22/08	Metals by 6010B	TAL Metals
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	Solids, Dry Weight by % Solids	
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	SVOCs, BNA by 8270C ✓	
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	Explosives by 8330A/8332 ✓	
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	Metals, Hg by 7471A ✓	
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	Metals by 6020A ✓	TAL Metals
0812032-09	Soil	AP0003	12/08/08 11:30	12/22/08	Metals by 6010B ✓	TAL Metals
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	Metals by 6020A	TAL Metals
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	Metals by 6010B	TAL Metals
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	SVOCs, BNA by 8270C	
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	Explosives by 8330A/8332	
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	Solids, Dry Weight by % Solids	
0812032-10	Soil	AP0006	12/08/08 13:35	12/22/08	Metals, Hg by 7471A	

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812032	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/24/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	Explosives by 8330A/8332	
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	Metals by 6020A	TAL Metals
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	Metals by 6010B	TAL Metals
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	Solids, Dry Weight by % Solids	
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	Metals, Hg by 7471A	
0812032-11	Soil	AP0019	12/08/08 15:54	12/22/08	SVOCs, BNA by 8270C	
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	Metals by 6020A	MS MSD, TAL Metals
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	Solids, Dry Weight by % Solids	MS MSD
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	Metals, Hg by 7471A	MS MSD
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	SVOCs, BNA by 8270C	MS MSD
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	Metals by 6010B	MS MSD, TAL Metals
0812032-12	Soil	AP0028	12/08/08 14:15	12/22/08	Explosives by 8330A/8332	MS MSD
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	Solids, Dry Weight by % Solids	
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	Explosives by 8330A/8332	
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	Metals by 6020A	TAL Metals
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	Metals by 6010B	TAL Metals
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	SVOCs, BNA by 8270C	
0812032-13	Soil	AP0058	12/08/08 14:15	12/22/08	Metals, Hg by 7471A	

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812032

Cooler ID: Default

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 853193279439

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/10/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.40°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? NA
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [signature]

Date: 12/10/08

0812033

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 10 08AML

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Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-10-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255 353583

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
	~~AP0014~~	SOIL	12-9-08 0855	Wide Mouth Glass Jar	~~9 oz~~ EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0812033-01	AP0016	SOIL	12-9-08 0840	Wide Mouth Glass Jar	9 ~~oz~~ EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0812033-02	AP0013	SOIL	12-9-08 0915	Wide Mouth Glass Jar	9 ~~oz~~ EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0812033-03	AP0025	SOIL	12-9-08 1100	Wide Mouth Glass Jar	9 ~~oz~~ EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
0812033-04	AP0009	SOIL	12-9-08 1355	Wide Mouth Glass Jar	9 ~~oz~~ EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: X

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: H. Jantin Date: 12-10-08 Time: 1800
1. Received by: Date: 12/11/08 Time: 0945am
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

0812033

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 10 08AML

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Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PHOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-10-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255353583

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0812033-05	AP 0024 MSD	SOIL	12-9-08 1055	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-06	AP 0007	SOIL	12-9-08 1350	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-07	AP 0006	SOIL	12-9-08 1352	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin — Date: 12-13-08 Time: 1800
1. Received by: [signature] — Date: 12/11/08 Time: 0945am
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
2. Received by: — Date: Time:

Comments:

0812033

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 10 08AML

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Bill To: Accounting, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923

Report To: Eddie Weaver, Shaw E & I, 312 Directors Drive, Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-10-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 0422553535 3

	Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
0812033-08	AP0014	SOIL	12-9-08 0835	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-09	AP0015	SOIL	12-9-08 0837	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-10	AP0010	SOIL	12-9-08 0910	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-11	AP0011	SOIL	12-9-08 0912	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-12	AP0012	SOIL	12-9-08 0912	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-13	AP0023	SOIL	12-9-08 1050	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-14	AP0063	SOIL	12-9-08 1050	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-05	AP0024	SOIL	12-9-08 1055	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
0812033-05	AP0024MS	SOIL	12-9-08 1055	Wide Mouth Glass Jar	9 ~~8~~ oz EW	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification: Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal: Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time: Normal: X Rush: ___

Level of QC Required: Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin	Date: 12-10-08 Time: 1200	1. Received by:	Date: 12/11/08 Time: 0945am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0812033

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 09 08AML

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Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-10-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: FedEx 842255 3583

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW 3002	WATER	12-9-08 1340	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
0812033-15			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return To Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X

Project Specific: ___

1. Relinquished by: Maria Ruiz-Martin — Date: 12-10-08 Time: 1800
1. Received by: [signature] — Date: 12/11/08 Time: 0945AM
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
2. Received by: — Date: Time:

Comments:

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Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812033	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/25/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	Solids, Dry Weight by % Solids	
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	Explosives by 8330A/8332	
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	Metals by 6010B	TAL Metals
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	Metals, Hg by 7471A	
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	Metals by 6020A	TAL Metals
0812033-01	Soil	AP0016	12/09/08 08:40	12/23/08	SVOCs, BNA by 8270C	
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	SVOCs, BNA by 8270C	
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	Metals, Hg by 7471A	
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	Metals by 6020A	TAL Metals
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	Explosives by 8330A/8332	
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	Solids, Dry Weight by % Solids	
0812033-02	Soil	AP0013	12/09/08 09:15	12/23/08	Metals by 6010B	TAL Metals
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	SVOCs, BNA by 8270C	
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	Metals by 6010B	TAL Metals
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	Explosives by 8330A/8332	
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	Solids, Dry Weight by % Solids	
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	Metals, Hg by 7471A	
0812033-03	Soil	AP0025	12/09/08 11:00	12/23/08	Metals by 6020A	TAL Metals
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	Solids, Dry Weight by % Solids	
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	Metals, Hg by 7471A	
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	Metals by 6020A	TAL Metals
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	Explosives by 8330A/8332	
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	SVOCs, BNA by 8270C	
0812033-04	Soil	AP0009	12/09/08 13:55	12/23/08	Metals by 6010B	TAL Metals

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812033	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/25/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	Metals, Hg by 7471A ✓	MS MSD
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	SVOCs, BNA by 8270C ✓	MS MSD
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	Metals by 6020A ✓	MS MSD, TAL Metals
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	PCBs by 8082 ✓	MS MSD
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	Explosives by 8330A/8332 ✓	MS MSD
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	Solids, Dry Weight by % Solids	MS MSD
0812033-05	Soil	AP0024	12/09/08 10:55	12/23/08	Metals by 6010B ✓	MS MSD, TAL Metals
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	Metals, Hg by 7471A	
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	Metals by 6020A	TAL Metals
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	Explosives by 8330A/8332	
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	Solids, Dry Weight by % Solids	
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	Metals by 6010B	TAL Metals
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	PCBs by 8082	
0812033-06	Soil	AP0007	12/09/08 13:50	12/23/08	SVOCs, BNA by 8270C	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	SVOCs, BNA by 8270C	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	PCBs by 8082	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	Metals, Hg by 7471A	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	Solids, Dry Weight by % Solids	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	Metals by 6020A	TAL Metals
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	Explosives by 8330A/8332	
0812033-07	Soil	AP0008	12/09/08 13:52	12/23/08	Metals by 6010B	TAL Metals

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812033	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/25/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	Solids, Dry Weight by % Solids	
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	PCBs by 8082	
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	SVOCs, BNA by 8270C	
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	Metals by 6020A	TAL Metals
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	Metals, Hg by 7471A	
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	Explosives by 8330A/8332	
0812033-08	Soil	AP0014	12/09/08 08:35	12/23/08	Metals by 6010B	TAL Metals
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	SVOCs, BNA by 8270C	
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	Explosives by 8330A/8332	
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	Metals by 6010B	TAL Metals
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	Metals by 6020A	TAL Metals
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	PCBs by 8082	
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	Solids, Dry Weight by % Solids	
0812033-09	Soil	AP0015	12/09/08 08:37	12/23/08	Metals, Hg by 7471A	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	Metals, Hg by 7471A	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	Metals by 6020A	TAL Metals
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	PCBs by 8082	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	SVOCs, BNA by 8270C	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	Explosives by 8330A/8332	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	Solids, Dry Weight by % Solids	
0812033-10	Soil	AP0010	12/09/08 09:10	12/23/08	Metals by 6010B	TAL Metals

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812033	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/25/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	Metals by 6020A	TAL Metals
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	Explosives by 8330A/8332	
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	Metals, Hg by 7471A	
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	SVOCs, BNA by 8270C	
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	Solids, Dry Weight by % Solids	
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	PCBs by 8082	
0812033-11	Soil	AP0011	12/09/08 09:12	12/23/08	Metals by 6010B	TAL Metals
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	SVOCs, BNA by 8270C	
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	PCBs by 8082	
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	Explosives by 8330A/8332	
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	Metals by 6010B	TAL Metals
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	Solids, Dry Weight by % Solids	
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	Metals by 6020A	TAL Metals
0812033-12	Soil	AP0012	12/09/08 09:12	12/23/08	Metals, Hg by 7471A	
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	Metals by 6010B	TAL Metals
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	Metals by 6020A	TAL Metals
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	Solids, Dry Weight by % Solids	
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	Explosives by 8330A/8332	
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	SVOCs, BNA by 8270C	
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	PCBs by 8082	
0812033-13	Soil	AP0023	12/09/08 10:50	12/23/08	Metals, Hg by 7471A	

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812033	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/25/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	Metals, Hg by 7471A	
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	PCBs by 8082	
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	Solids, Dry Weight by % Solids	
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	SVOCs, BNA by 8270C	
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	Metals by 6010B	TAL Metals
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	Metals by 6020A	TAL Metals
0812033-14	Soil	AP0063	12/09/08 10:50	12/23/08	Explosives by 8330A/8332	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Alkalinity by 310.1	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals, Dissolved by 6010B	Dissolved TAL Metals
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	SVOCs, BNA by 8270C	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Cyanide by 335.2	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Explosives by 8330A/8332	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	TSS by 160.2	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals by 6010B	Hardness and TAL Metals
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	TDS by 160.1	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals, Hg by 7470A	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals by 6020A	Hardness and TAL Metals
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Turbidity by 180.1	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Metals, Hg Dissolved by 7470A	
0812033-15	Water	WW3002	12/09/08 13:40	12/23/08	Nitrate/Nitrite by SM-4500-NO3 E	

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812033

Cooler ID: AML1212

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353583

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/11/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.60°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? NA
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review:

Date: 12/11/08

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812033

Cooler ID: AML601

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353583

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/11/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.00°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review:

Date: 12/11/08

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 09 08TA

PAGE 1 OF 2

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-9-08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0061	SOIL	12-8-08 1415	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw Date: 12/12/08 Time: 1500
1. Received by: Henry Bruna Date: 12/12/08 Time: 9:45
2. Relinquished by: Date: Time:
2. Received by: Date: Time:
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 10 08TA

PAGE 2 OF 2

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-10-08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0062	SOIL	12-9-08 0912	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
AP0057	SOIL	12-9-08 1050	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 12/12/08 Time: 1800	1. Received by: Terry Burns	Date: 12/12/08 Time: 9:45
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 11 08TA

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-12-08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255335540

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW0065A	SOIL	12-10-08 1410	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yontin — Date: 12-12-08 Time: 1800
1. Received by: Gary Bruno — Date: 12/13/08 Time: 9:15
2. Relinquished by: — Date: Time:
2. Received by: — Date: Time:
3. Relinquished by: — Date: Time:
2. Received by: — Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 11 08TA

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-12-08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255353540

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW0068	SOIL	12-10-08 1612	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yarton	Date: 12-12-08 Time: 1900	1. Received by: Terry Bruno	Date: 12/13/08 Time: 9:15
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB12 12 08TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-12-08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8422 553 3540

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW0065	SOIL	12-11-08 1555	2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	SOIL		2-Wide Mouth Jars	4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
			Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yeatin	Date: 12-12-08 Time: 1400	1. Received by: Terry Bruno	Date: 12/13/08 Time: 9:15
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

TestAmerica Cooler Receipt Form/Narrative **Lot Number:** ABL 130179
North Canton Facility

Client Analytical Mgmt Project Shaw/Plumbrook By: Terry Bruns
Cooler Received on 12/12/08 Opened on 12/12/08 (Signature)
FedEx ☐ UPS ☒ DHL ☐ FAS ☐ Stetson ☐ Client Drop Off ☐ TestAmerica Courier ☐ Other ____
TestAmerica Cooler # ____ Multiple Coolers ☐ Foam Box ☐ Client Cooler ☒ Other ____

1. Were custody seals on the outside of the cooler(s)? Yes ☐ No ☒ Intact? Yes ☐ No ☐ NA ☒
   If YES, Quantity ____ Quantity Unsalvageable ____
   Were custody seals on the outside of cooler(s) signed and dated? Yes ☐ No ☐ NA ☒
   Were custody seals on the bottle(s)? Yes ☐ No ☒
   If YES, are there any exceptions? ____
2. Shippers' packing slip attached to the cooler(s)? Yes ☒ No ☐
3. Did custody papers accompany the sample(s)? Yes ☐ No ☒ No COC Relinquished by client? Yes ☐ No ☒
4. Were the custody papers signed in the appropriate place? Yes ☐ No ☒
5. Packing material used: Bubble Wrap ☒ Foam ☐ None ☐ Other ____
6. Cooler temperature upon receipt 4.9 °C See back of form for multiple coolers/temps ☐
   METHOD: IR ☒ Other ☐ ____
   COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐
7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Could all bottle labels be reconciled with the COC? Yes ☐ No ☒ No COC
9. Were sample(s) at the correct pH upon receipt? Yes ☐ No ☐ NA ☒
10. Were correct bottle(s) used for the test(s) indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Sufficient quantity received to perform indicated analyses? Yes ☒ No ☐
13. Was a trip blank present in the cooler(s)? Yes ☐ No ☒ Were VOAs on the COC? Yes ☐ No ☒

Contacted PM ____ Date ____ by ____ via Verbal ☐ Voice Mail ☐ Other ☐
Concerning ____

14. CHAIN OF CUSTODY

The following discrepancies occurred:
No COC – received 1 cooler UPS 12/12/08 @ 9:45
Rec'd AP0057 12/9/08 @ 10:50 1X100 ml for
nitroaromatics + 1X100 ml for TAL metals, PCB's, +
TCL SVOC's; AP0061 12/8/08 @ 14:45 2X100 ml same
tests as AP0057; AP0062 12/9/08 @ 09:12 2X100 ml
same tests as AP0057 Project # 773206 → see back

15. SAMPLE CONDITION

Sample(s) ____ were received after the recommended holding time had expired.
Sample(s) ____ were received in a broken container.
Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) ____ were further preserved in Sample Receiving to meet recommended pH level(s). *Nitric Acid Lot# 100108-HNO_3; Sulfuric Acid Lot# 100108-H_2SO_4; Sodium Hydroxide Lot# 073007 -NaOH; Hydrochloric Acid Lot# 092006-HCl; Sodium Hydroxide and Zinc Acetate Lot# 050205-$(CH_3COO)_2ZN$/NaOH.* What time was preservative added to sample(s)? ____

Client ID	pH	Date	Initials

TestAmerica Cooler Receipt Form/Narrative **Lot Number:** A8L130179
North Canton Facility

Client Shaw Eco. Project PBOW By: Terry Burns
Cooler Received on 12/13/08 Opened on 12/13/08 (Signature)
FedEx ☐ UPS ☐ DHL ☐ FAS ☐ Stetson ☐ Client Drop Off ☐ TestAmerica Courier ☐ Other ____
TestAmerica Cooler # A106 Multiple Coolers ☐ Foam Box ☐ Client Cooler ☐ Other ____

1. Were custody seals on the outside of the cooler(s)? Yes ☒ No ☐ Intact? Yes ☒ No ☐ NA ☐
   If YES, Quantity 2 Quantity Unsalvageable ____
   Were custody seals on the outside of cooler(s) signed and dated? Yes ☒ No ☐ NA ☐
   Were custody seals on the bottle(s)? Yes ☐ No ☒
   If YES, are there any exceptions? ____
2. Shippers' packing slip attached to the cooler(s)? Yes ☒ No ☐
3. Did custody papers accompany the sample(s)? Yes ☒ No ☐ Relinquished by client? Yes ☒ No ☐
4. Were the custody papers signed in the appropriate place? Yes ☒ No ☐
5. Packing material used: Bubble Wrap ☒ Foam ☐ None ☐ Other ____
6. Cooler temperature upon receipt 1.8 °C See back of form for multiple coolers/temps ☐
   METHOD: IR ☒ Other ☐ ____
   COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐
7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Could all bottle labels be reconciled with the COC? Yes ☒ No ☐
9. Were sample(s) at the correct pH upon receipt? Yes ☐ No ☐ NA ☒
10. Were correct bottle(s) used for the test(s) indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Sufficient quantity received to perform indicated analyses? Yes ☒ No ☐
13. Was a trip blank present in the cooler(s)? Yes ☐ No ☒ Were VOAs on the COC? Yes ☐ No ☒

Contacted PM ____ Date ____ by ____ via Verbal ☐ Voice Mail ☐ Other ☐
Concerning ____

14. CHAIN OF CUSTODY

The following discrepancies occurred:
Rec'd WW0065A, WW0068, + WW0065 + COC's for samples AP0061, AP0062, + AP0057 rec'd 12/12/08.

15. SAMPLE CONDITION

Sample(s) ____ were received after the recommended holding time had expired.
Sample(s) ____ were received in a broken container.
Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) ____ were further preserved in Sample Receiving to meet recommended pH level(s). *Nitric Acid Lot# 100108-HNO_3; Sulfuric Acid Lot# 100108-H_2SO_4; Sodium Hydroxide Lot# 073007 -NaOH; Hydrochloric Acid Lot# 092006-HCl; Sodium Hydroxide and Zinc Acetate Lot# 050205-$(CH_3COO)_2ZN/NaOH$.* What time was preservative added to sample(s)? ____

Client ID	pH	Date	Initials

0812042

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 12 08AML

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/12/08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8412255 3350

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP 3001 0812042-01	WATER	12/11/08 1535	2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L.	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL.	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		2 - Amber	1 L.	Cool	Explosives by 8330		
			1 - HDPE	500 mL.	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL.	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L.	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL.	H2SO4	Nitrate		
			1 - HDPE	500 mL.	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L.	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification;
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X

AML62: 2.6°C
AML1: 2.5°C
AML2: 2.1°C

Project Specific: ___

1. Relinquished by: M. Yantin	Date: 12/12/08 Time: 1800	1. Received by:	Date: 12/13/08 Time: 0930am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0812042

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 12 08AML

PAGE 1 OF 2

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/12/08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9422553353550

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3000	WATER	12/12/08 1100	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
0812042-02			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-1	WATER	12/12/08 1200	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C, TCL VOCs*	added for analysis Per David 12/13/08	
			1 - HDPE	125 mL	H2SO4	Nitrate		
0812042-03			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-3	TB	12/12/08					0812042-06	

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yanton	Date: 12/12/08 Time: 1800	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

0812042

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 12 08AML

PAGE 1 OF 2

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/12/08
Laboratory Designation: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255353550

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP3000	WATER	12/12/08 1100	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
0812042-02			1 - HDPE	500 mL	NaOH	Cyanide by 9010 9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-1	WATER	12/12/08 1200	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C, TCL VOCs added for analysis per David 12/13/08		
			1 - HDPE	125 mL	H2SO4	Nitrate		
0812042-03			1 - HDPE	500 mL	NaOH	Cyanide by 9010 9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-3	TB	12/12/08					0812042-06	

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin	Date: 12/12/08 Time: 1800	1. Received by:	Date: 12/13/08 Time: 0930AM
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

812042

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 12 08AML

PAGE 2 OF 2

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-12-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 942255353550

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
122008-2	WATER	12/12/08 1355	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C, TCLVOCs added for analysis		Per David KS 12-12-08
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
812042-04			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-4	WATER	12/12/08 1445	2 - Amber	1 L	Cool	Explosives by 8330		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals by 6010B/7470A~~ MR		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~ MR		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~ MR		
			~~1 - HDPE~~	~~125 mL~~	~~H2SO4~~	~~Nitrate~~ MR		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~ MR		
812042-05			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~ MR		

Special Instructions:

Possible Hazard Identification:

Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:

Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:

Normal: X Rush: ____

Level of QC Required:

Definitive: X Project Specific: ____

1. Relinquished by: H. Yantin	Date: 12-12-08 Time: 1800	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Shaw
Shaw E & I, Inc.

0812042

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 12 08AML

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12-12-08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No: 9422 5535 3550

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
122008-2	WATER	12/12/08 1355	2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 ml.	HNO3	Total TAL Metals by 6010B 7470A		
			1 - HDPE	500 ml.	HNO3	Dissolved TAL Metals by 6010B 7470A		
			2 - Amber	1 L	Cool	TCL SVOC's by 8270C , TCL VOCs added for analysis per David DA 12-13-08		
			1 - HDPE	125 ml.	H2SO4	Nitrate		
			1 - HDPE	500 ml.	NaOH	Cyanide by 9010 9012		
0812042-04			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
122008-4	WATER	12/12/08 1445	2 - Amber	1 L	Cool	Explosives by 8330		
			~~1 - HDPE~~	~~500 ml.~~	~~HNO3~~	~~Total TAL Metals by 6010B 7470A~~ MR		
			~~1 - HDPE~~	~~500 ml.~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B 7470A~~ MR		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOC's by 8270C~~ MR		
			~~1 - HDPE~~	~~125 ml.~~	~~H2SO4~~	~~Nitrate~~ MR		
			~~1 - HDPE~~	~~500 ml.~~	~~NaOH~~	~~Cyanide by 9010 9012~~ MR		
0812042-05.			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~ MR		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantis	Date: 12-12-08 Time: 1800	1. Received by:	Date: 12/13/08 Time: 0930am.
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812042	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/27/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	TDS by 160.1	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Cyanide by 335.2	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals, Hg by 7470A	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals, Dissolved by 6010B	Dissolved TAL Metals
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals, Hg Dissolved by 7470A	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Alkalinity by 310.1	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	SVOCs, BNA by 8270C	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Turbidity by 180.1	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Explosives by 8330A/8332	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals by 6010B	TAL Metals
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Nitrate/Nitrite by SM-4500-NO3 E	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	TSS by 160.2	
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812042-01	Water	AP3001	12/11/08 15:35	12/25/08	Metals by 6020A	TAL Metals

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812042	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/27/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Explosives by 8330A/8332	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals by 6010B	TAL Metals
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals, Hg Dissolved by 7470A	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	TSS by 160.2	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Turbidity by 180.1	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	TDS by 160.1	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals by 6020A	TAL Metals
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Alkalinity by 310.1	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	SVOCs, BNA by 8270C	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals, Hg by 7470A	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Cyanide by 335.2	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Metals, Dissolved by 6010B	Dissolved TAL Metals
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Nitrate/Nitrite by SM-4500-NO3 E	
0812042-02	Water	AP3000	12/12/08 11:00	12/25/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812042	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/27/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals, Hg by 7470A	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals by 6020A	TAL Metals
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	TSS by 160.2	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals by 6010B	TAL Metals
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	VOCs by 8260B	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Explosives by 8330A/8332	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Nitrate/Nitrite by SM-4500-NO3 E	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	SVOCs, BNA by 8270C	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals, Hg Dissolved by 7470A	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Cyanide by 335.2	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Alkalinity by 310.1	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	TDS by 160.1	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Turbidity by 180.1	
0812042-03	Water	122008-1	12/12/08 12:00	12/25/08	Metals, Dissolved by 6010B	Dissolved TAL Metals

Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number	0812042	**Client AML ID**	Shaw E&I, Inc	**Report Lvl.** 3
Work Order Due Date	12/27/08	**Client Project ID**	PBOW	
Work Order TAT	14			

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	VOCs by 8260B	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	TSS by 160.2	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Alkalinity by 310.1	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Nitrate/Nitrite by SM-4500-NO3 E	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals by 6010B	TAL Metals
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals, Dissolved by 6010B	Dissolved TAL Metals
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	SVOCs, BNA by 8270C	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals by 6020A	TAL Metals
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals, Hg Dissolved by 7470A	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Explosives by 8330A/8332	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Turbidity by 180.1	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	TDS by 160.1	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Cyanide by 335.2	
0812042-04	Water	122008-2	12/12/08 13:55	12/25/08	Metals, Hg by 7470A	
0812042-05	Water	122008-4	12/12/08 14:45	12/25/08	Explosives by 8330A/8332	
0812042-06	Water	TB 122008-03	12/12/08 00:00	12/25/08	VOCs by 8260B	

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812042

Cooler ID: AML1

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353550

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/13/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.50°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions: VOC analysis was not marked for Sample 122008-01 and 122008-02. Per David to add them on the COC.

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes (if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [signature]

Date: 12/15/08

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

AML Work Order Number: 0812042

Project ID: PBOW

Cooler ID: AML62

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353550

Custody Seals

Were Custody Seals Present? Yes

Cooler Opened By: Nissa Said

Were Custody Seals Intact? Yes

Date Opened 12/13/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.60°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions: VOC analysis was not marked for Sample 122008-01 and 122008-02. Per David to add them on the COC.

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [illegible]

Date: 12/15/08

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812042

Cooler ID: AML2

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353550

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/13/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.10°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? No

Comments/ Exceptions: VOC analysis was not marked for Sample 122008-01 and 122008-02. Per David to add them on the COC.

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes (if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [signature]

Date: 12/15/08

0812046

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 16 08AML

PAGE 1 OF 2

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/16/08
Laboratory Destination: AML
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842257383539

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW 3005	WATER	12/15/08 1350	2 - Amber	1 L.	Cool	Explosives by 8330		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals by 6010B 7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B 7470A~~		
			2 - Amber	1 L.	Cool	TCL SVOCs by 8270C		
			~~1 - HDPE~~	~~125 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
0812046-01			~~1 - HDPE~~	~~1 L.~~	Cool	Turbidity, Alkalinity, ~~TDS~~, TSS, Sulfate, Chloride		
AP 3003	WATER	12/15/08 1350	2 - Amber	1 L.	Cool	Explosives by 8330		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals by 6010B 7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B 7470A~~		
			2 - Amber	1 L.	Cool	TCL SVOCs by 8270C		
			~~1 - HDPE~~	~~125 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
0812046-02			~~1 - HDPE~~	~~1 L.~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yontin - Shaw	Date: 12/16/08 Time: 1800	1. Received by:	Date: 12/17/08 Time: 1100AM
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

9/01/92

812046

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 16 08AML

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name No.: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/16/08
Laboratory Destination: AMI
Laboratory Contact: Melania Harris
Project Contact Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8422553535 39

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
PBOW04	WATER	12/16/08 0910	2 - Amber MC	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber MC	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
812046-03			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: H. Dalton	Date: 12/16/08 Time: 1800	1. Received by:	Date: 12/17/08 Time: 1100am
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

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Analytical Management Laboratories - Sample Status and Receipt Report

AML Project Number 0812046 **Client AML ID** Shaw E&I, Inc **Report Lvl.** 3

Work Order Due Date 12/31/08 **Client Project ID** PBOW

Work Order TAT 14

AML Sample	*Matrix*	Client Sample ID	Date Collected	Projected Analytical Due Date	Analysis	Comments
0812046-01	Water	WW3005	12/13/08 13:50	12/29/08	SVOCs, BNA by 8270C	
0812046-01	Water	WW3005	12/13/08 13:50	12/29/08	Explosives by 8330A/8332	
0812046-02	Water	AP3003	12/15/08 13:50	12/29/08	Explosives by 8330A/8332	
0812046-02	Water	AP3003	12/15/08 13:50	12/29/08	SVOCs, BNA by 8270C	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	TSS by 160.2	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals by 6010B	TAL Metals
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Explosives by 8330A/8332	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	SVOCs, BNA by 8270C	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals by 6020A	TAL Metals
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Turbidity by 180.1	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals, Hg by 7470A	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	TDS by 160.1	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Alkalinity by 310.1	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Cyanide by 335.2	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Nitrate/Nitrite by SM-4500-NO3 E	
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals, Dissolved by 6010B	Dissolved TAL Metals
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals, Dissolved by 6020A	Dissolved TAL Metals
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Inorganic Anions by 300.0	Nitrate, Sulfate, Chloride
0812046-03	Water	AP3004	12/16/08 09:10	12/29/08	Metals, Hg Dissolved by 7470A	

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

Project ID: PBOW

AML Work Order Number: 0812046

Cooler ID: AML1121

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353539

Custody Seals

Were Custody Seals Present? Yes

Were Custody Seals Intact? Yes

Cooler Opened By: Nissa Said

Date Opened 12/17/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 1.90°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? Yes

Comments/ Exceptions

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [signature]

Date: 12/17/08

Analytical Management Laboratories, Inc.

AML - Sample Condition Upon Receipt Report
(See Comments for exceptions)

Client ID:

AML Work Order Number: 0812046

Project ID: PBOW

Cooler ID: AML9191

Delivery Method

Delivery Method: Fed Ex

Name of Person Receiving Samples: Nissa Said

Airbill Number: 842255353539

Custody Seals

Were Custody Seals Present? Yes

Cooler Opened By: Nissa Said

Were Custody Seals Intact? Yes

Date Opened 12/17/2008

Packaging / Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 2.00°C

Type of Packing Used: Bubble Wrap

Did all the bottles arrive unbroken? Yes

Were all bottles sealed in separate plastic bags? Yes

Chain of Custody

Was Chain of Custody filled out properly? Yes

Do Chain of Custody and Sample Labels agree? No

Comments/ Exceptions

Were all sample labels complete? Yes

Was a sufficient amount of sample sent for analysis? Yes

Were samples received in proper containers? Yes

Were air bubbles absent in VOA samples? NA

Was sample pH within QC limits? Yes
(if no see comments)

Was project manager contacted about any "out of control" issues? Yes

Samples Received by: Nissa Said

Project Manager Review: [signature]

Date: 12/17/08

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW12 ~~15~~ 16 ~~DKK~~ 08AML

PAGE 1 OF 1

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132288
Required Report Date: 21 DAYS

Sample Shipment Date: 12/~~18~~ 16 DKK/08
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 842255535528

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
WW 3013	WATER	12/15/08 1350	2 - Amber	1 L	Cool	Explosives by 8330		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			~~1 - HDPE~~	~~125 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
	WATER		2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	1 L	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	1 L	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	250 mL	HNO3	Hardness		
			1 - HDPE	250 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride, Nitrate		

Special Instructions: Nitros - SVOCs only for WW3013

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X 16 Project Specific: ___

1. Relinquished by: H. Yentir - Shaw	Date: 12/18/08 Time: 1800	1. Received by: TEST AMERICA	Date: 17 DEC 2008 Time: 1020
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

TestAmerica Cooler Receipt Form/Narrative **Lot Number:** A8L170228
North Canton Facility

Client SHAW Project PROW By: Mark
Cooler Received on 17 DEC 2008 Opened on 17 DEC 2008 (Signature)
FedEx [X] UPS [ ] DHL [ ] FAS [ ] Stetson [ ] Client Drop Off [ ] TestAmerica Courier [ ] Other
TestAmerica Cooler # K829 Multiple Coolers [ ] Foam Box [ ] Client Cooler [ ] Other

1. Were custody seals on the outside of the cooler(s)? Yes [ ] No [X] Intact? Yes [ ] No [ ] NA [X]
   If YES, Quantity Quantity Unsalvageable
   Were custody seals on the outside of cooler(s) signed and dated? Yes [ ] No [ ] NA [X]
   Were custody seals on the bottle(s)? Yes [ ] No [X]
   If YES, are there any exceptions?
2. Shippers' packing slip attached to the cooler(s)? Yes [X] No [ ]
3. Did custody papers accompany the sample(s)? Yes [X] No [ ] Relinquished by client? Yes [X] No [ ]
4. Were the custody papers signed in the appropriate place? Yes [X] No [ ]
5. Packing material used: Bubble Wrap [X] Foam [ ] None [ ] Other PLASTIC BAG
6. Cooler temperature upon receipt 0.4 °C See back of form for multiple coolers/temps [ ]
   METHOD: IR [X] Other [ ]
   COOLANT: Wet Ice [X] Blue Ice [ ] Dry Ice [ ] Water [ ] None [ ]
7. Did all bottles arrive in good condition (Unbroken)? Yes [X] No [ ]
8. Could all bottle labels be reconciled with the COC? Yes [X] No [ ]
9. Were sample(s) at the correct pH upon receipt? Yes [ ] No [ ] NA [X]
10. Were correct bottle(s) used for the test(s) indicated? Yes [X] No [ ]
11. Were air bubbles >6 mm in any VOA vials? Yes [ ] No [ ] NA [X]
12. Sufficient quantity received to perform indicated analyses? Yes [X] No [ ]
13. Was a trip blank present in the cooler(s)? Yes [ ] No [X] Were VOAs on the COC? Yes [ ] No [X]

Contacted PM Date by via Verbal [ ] Voice Mail [ ] Other [ ]
Concerning

14. CHAIN OF CUSTODY

The following discrepancies occurred:

15. SAMPLE CONDITION

Sample(s) were received after the recommended holding time had expired.
Sample(s) were received in a broken container.
Sample(s) were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) were further preserved in Sample Receiving to meet recommended pH level(s). *Nitric Acid Lot# 100108-HNO_3; Sulfuric Acid Lot# 031808-H_2SO_4; Sodium Hydroxide Lot# 073007 -NaOH; Hydrochloric Acid Lot# 092006-HCl; Sodium Hydroxide and Zinc Acetate Lot# 050205-$(CH_3COO)_2ZN/NaOH$.* What time was preservative added to sample(s)?

Client ID	pH	Date	Initials

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F65921

E.T.

REFERENCE COC NO.: PW05 07 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/8/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1926

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP 3050	WATER	5/7/09 1440	3 VOA Vial	40ml	HCL	VOC's by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
2	ER 5	WATER	5/7/09 1320	3 VOA Vial	40ml	HCL	VOC's by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOC's by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ✓

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: H. Yanton	Date: 5/7/09 Time: 1700	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by: / Accutest	Date: 5-9-09 Time: 1000
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

2.4 2.6 2.8 3.0 2.6

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65790 1
2.T.

REFERENCE COC NO.: PW05 0 8 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/8/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1926

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 WW3015	WATER	5/7/09 1415	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 ER6	WATER	5/7/09 1635	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~ mk		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5/8/09 Time: 1300	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [signature] Accutest	Date: 5-8-09 Time: 10:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
2.4 2.6 3.0 2.8 2.6

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF CUSTODY RECORD

P65190

REFER NO: PW05 08 09ACCT

PAGE 1 OF 1

E.T.

Project Name No: PROW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/8/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 3672 3651 1926

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type Description	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Testing Program	Condition on Receipt	Disposal Record
WW3016	WATER	5/8/09 0915	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 ml	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	MRW 5/8/09	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 ml	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 5/8/09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: [signature] / Accutest	Date: 5-9-09 Time: 10:20
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
2.4 2.6 2.8 2.6 3.0

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FL6519A-1 ET CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5.9.09 10:00 # OF COOLERS RECEIVED: 5 COOLER TEMPS: 2.4 2.6 2.8 3.0 2.6

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3651 1926

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [X] TRIP BLANK NOT PROVIDED
- [X] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE E.T. 5.9.09 TECHNICIAN SIGNATURE/DATE CLR 5/9/09

ASBD 12/17/07

Job Change Order: F65191_5/12/2009

Requested Date:	5/12/2009	**Received Date:**	5/9/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	6/1/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #:
F65191-1,2,3,4,5

Change: Per Eddie Weaver @ Shaw via phone 05.11.09, PBOW is running ONLY NO2/NO3 from a preserved bottle, not Nitrate.

Above Changes Eddie Weaver @ Shaw via phone **Date:** 5/12/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F65208

REFERENCE COD[illegible] PW[illegible] 09ACCT

PAGE 1 OF 1

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~123467-WWTP03/AP1&2~~ SLX
Required Report Date: 21 DAYS

Sample Shipment Date: 5/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1947

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP 3052	WATER	5/11/09 0755	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
2	051109-TB	WATER	5/11/09 1600	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: H. Yantin	Date: 5/11/09 Time: 1700	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 5/12/09 Time: 9:00	2. Received by: [illegible] /Accutest	Date: 5/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

3.8 2.6 2.4 2.8
3.4 2.6 2.0 2.6

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65208 CLIENT: Shaw PROJECT: DBON

DATE/TIME RECEIVED: 5/12/09 9:00 # OF COOLERS RECEIVED: 9 COOLER TEMPS: 2.4 2.6 2.4 2.8 3.4 2.6 2.0 2.6 2.2

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8677 3651 1948

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [x] TRIP BLANK PROVIDED
- [ ] TRIP BLANK NOT PROVIDED
- [ ] TRIP BLANK NOT ON COC
- [x] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [x] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE CRS 5/9/09 TECHNICIAN SIGNATURE/DATE JCopne 5-12-09

ASBD 12/17/07

Job Change Order: F65208_5/26/2009

Requested Date:	5/26/2009	**Received Date:**	5/12/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	6/2/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #:
F65208-all

Change: Per Eddie this job is Project#132457, PO#499573

Above Changes Eddie Weaver @ Shaw via e-mail **Date:** 5/26/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F65209

REFERENCE COC NO.: PW05 4 09ACCT

PAGE 1 OF 1

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~137767 Rail Car Washing Area~~ 132459, WWTPI
Required Report Date: 21 DAYS

Sample Shipment Date: 5/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672365119 48

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	WW3020	WATER	5/9/09 0955	3 VOA Vial	40ml	HCL	VOC's by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
2	WW3017	WATER	1410	3 VOA Vial	40ml	HCL	VOC's by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5/11/09 Time: 1500	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: Time:	2. Received by: [signature] / Accutest	Date: 5/12/09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
2.4 2.6 2.4 2.8 3.7
2.6 2.0 2.4 2.2

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65209

REFERENCE COC NO.: PW05 10 09ACCT

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 9651 1948

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 ~~AP1 HW02~~ MR AP 3051	WATER	5/10/09 0810	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 AP 3054	WATER	5/10/09 0900	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin-Shaw	Date: 5/11/09 Time: 1500	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [signature] /Accutest	Date: 5.12.09 Time: 09:20
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

2.4 2.6 2.4 2.8 3.4
2.6 2.0 2.6 2.2

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F65209

REFERENCE COC NO.: PW05 09 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9672 3651 1949

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP 3053	WATER	5/9/09 0815	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: ✓

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: H. Yantin - Shaw	Date: 5/11/09 Time: 1800	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [signature] / Accutest	Date: 5/12/09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

2.4 2.6 2.4 2.8

2.4 2.6 2.0 2.6 2.2

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65209

REFERENCE COC NO.: PW05 10 09ACCT

PAGE 2 OF 2

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 WWTP1&3/AP1&3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1948

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
ER1	WATER	5/10/09 1200	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	HOLD 5/11/09	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: M. Yantin Shaw	Date: 5/11/09 Time: 1700	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: Time:	2. Received by: [signature] / Accutest	Date: 5.12.09 Time: 0700
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

2.4 2.6 2.4 3.4
2.6 2.8 2.0 2.6 2.2

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65209 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5-12-09 09:00 # OF COOLERS RECEIVED: 9 COOLER TEMPS: 2.7 2.6 2.6 2.4 2.8 3.4 2.0 2.6 2.2

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3451 1948

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [X] TRIP BLANK NOT PROVIDED
- [X] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [X] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [X] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS: WC analysis 1-5 recieved out of hold, Samp 3:4 recieved 1 Amber broken, Samp 5 only recieved 3 Ambers

TECHNICIAN SIGNATURE/DATE E.T. 5-12-09 TECHNICIAN SIGNATURE/DATE JC 5-12-09

ASBD 12/17/07

Job Change Order: F65209_5/13/2009

Requested Date:	5/13/2009	**Received Date:**	5/12/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	6/2/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #:
F65209-all Nitrate samples

Change: Per Eddie, even though coc says Nitrate, lab is to run preserved method for Nitrate/Nitrite combined.

Above Changes Eddie Weaver @ Shaw via phone **Date:** 5/13/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

P65373

REFERENCE COC NO.: PW05 19 09ACCT

PAGE ___ OF ___

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash pit 1
Required Report Date: 21 DAYS

Sample Shipment Date: 5/19/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1937 - FedEx

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP2012	WATER	5/19/09 1045	2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
2	AP2008	WATER	5/19/09 1400	2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
		WATER		2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
		WATER	DKR	2 - Amber	1 L	Cool	Explosives by 8330A DKR		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5-19-09 Time: 1800	1. Received by: FR	Date: Time:
2. Relinquished by: FR	Date: Time:	2. Received by: Accutest	Date: 5-21-09 Time: 09:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

5-6

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: P65373 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5-21-09 09:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 5-6

METHOD OF DELIVERY: FEDEX UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3651 1937

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE E.T. 5.21.09 TECHNICIAN SIGNATURE/DATE CL 5/21/09

ASBD 12/17/07

F65374

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 19 09ACCT

PAGE 1 OF 1

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash Pit 1 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/19/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1937-FedX

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
~~AP1012 DKK~~	~~Sediment DKK~~	~~5/19/09 1410 DKK~~	~~CWM~~	~~4 oz~~	~~Cool~~	~~PCBs by 8082~~		
			~~CWM~~	~~4 oz~~	~~Cool~~	~~TOC by Walkley Black~~		
			~~CWM~~	~~4 oz~~	~~Cool~~	~~SVOCs by 8270C~~		
			~~CWM~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330A~~		
			~~CWM~~	~~4 oz~~	~~Cool~~	~~TAL Metals 6010/7471~~		
1 AP1012	Sediment	5/19/09 1110	CWM	4 oz	Cool	PCBs by 8082		
			CWM	4 oz	Cool	SVOCs by 8270C		
			CWM	4 oz	Cool	Explosives by 8330A		
			CWM	4 oz	Cool	TAL Metals 6010/7471		
2 AP1008	Sediment	5/19/09 1425	CWM	4 oz	Cool	PCBs by 8082		
			CWM	4 oz	Cool	SVOCs by 8270C		
			CWM	4 oz	Cool	Explosives by 8330A		
			CWM	4 oz	Cool	TAL Metals 6010/7471		
	Sediment		CWM	4 oz	Cool	PCBs by 8082		
			CWM	4 oz	Cool	SVOCs by 8270C		
			CWM	4 oz	Cool	Explosives by 8330A		
			CWM	4 oz	Cool	TAL Metals 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: Flammable: Poison B: Unknown: X

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific:

1. Relinquished by: David Kessler - Shaw	Date: 5/19/09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 5/21/09 Time: 9:30	2. Received by: CK / Accutest	Date: 5/21/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.4

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65374 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/21/09 9:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 4.4

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3651 1937

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE CL 5/21/09 TECHNICIAN SIGNATURE/DATE E.T. 5.21.09

ASBD 12/17/07

F65380

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 20 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash Pit 1 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1970 Fedex

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP1007	Sediment	5/19/09 1715	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	TOC by Walkley Black		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
2	AP1013	Sediment	5/20/09 0855	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
		Sediment		CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
		Sediment		CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 5-20-09 Time: 1800	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: 5/21/09 Time: 9:30	2. Received by: Cl /Accutest	Date: 5/21/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.0

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65380 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/21/09 9:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 4.0

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8678 3651 1970

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OF LAB FILTERED METALS ? 0

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE [signature] 5/21/09 TECHNICIAN SIGNATURE/DATE E.T. 5-21-09

ASBD 12/17/07

F65381

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 20 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash pit 1
Required Report Date: 21 DAYS

Sample Shipment Date: 5/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1970 FedEx

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP2007	WATER	5/19/09 1700	2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
2	AP2013	WATER	5/20/09 0830	2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
		WATER		2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		
		WATER		2 - Amber	1 L	Cool	Explosives by 8330A		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	PCBs by 8082		
				2 - Amber	1 L	Cool	SVOCs by 8270C		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 5-20-09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 5/21/09 Time: 9:00	2. Received by: Clark / Accutest	Date: 5/21/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.2

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FC65381 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/21/09 9:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 4.2

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3651 1970

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OF LAB FILTERED METALS ? 0

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE [signature] 5/21/09 TECHNICIAN SIGNATURE/DATE [signature] 5-21-09

ASBD 12/17/07

P65472

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 26 09ACCT

PAGE 1 OF

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash pit 3
Required Report Date: 21 DAYS

Sample Shipment Date: 5/26/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 125X

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP2009	Surface Water	5-23-09 1640	2 - Amber	1 L	Cool	Explosives by 8330A		
2	AP2010		5-23-09 1715	2 - Amber	1 L	Cool	Explosives by 8330A		
3	AP 2011		5-23-09 1740	2 - Amber	1 L	Cool	Explosives by 8330A		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5-26-09 Time: 1630	1. Received by:	Date: Time:
2. Relinquished by:	Date: 5/27/09 Time: 9:00	2. Received by: Accutest	Date: 5/27/09 Time: 5/27/09 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: 9:00 Time:

Comments:

3.8

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65472 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/27/09 9:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 3.8

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8684 4331 1258

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [x] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
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- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [x] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS: AP 2011 recieved Both Ambers Broken 8330 no volume for analysis.

TECHNICIAN SIGNATURE/DATE CLR 5/27/09 TECHNICIAN SIGNATURE/DATE E.T. 5-27-09

ASBD 12/17/07

Job Change Order: F65472_5/27/2009

Requested Date:	5/27/2009	**Received Date:**	5/27/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	6/17/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #:	**Change:**
F65472-AP2011	Both liter ambers for this sample were received broken. Client notified 8330 can not be performed.

Above Changes Eddie/David @ Shaw via phone **Date:** 5/27/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

F65374

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB05 19 09ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash Pit 1 Sediment
Required Report Date: 21 DAYS

Sample Shipment Date: 5/19/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8672 3651 1937-FedX

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
	~~AP1012 DKK~~	~~Sediment DKK~~	~~5/19/09 1110 DKK~~	~~CWM~~	~~4 oz~~	~~Cool~~	~~PCBs by 8082~~		
				~~CWM~~	~~4 oz~~	~~Cool~~	~~TOC by Walkley Black~~		
				~~CWM~~	~~4 oz~~	~~Cool~~	~~SVOCs by 8270C~~		
				~~CWM~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330A~~		
				~~CWM~~	~~4 oz~~	~~Cool~~	~~TAL Metals 6010/7471~~		
1	AP1012	Sediment	5/19/09 1110	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
2	AP1008	Sediment	5/19/09 1425	CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		
		Sediment		CWM	4 oz	Cool	PCBs by 8082		
				CWM	4 oz	Cool	SVOCs by 8270C		
				CWM	4 oz	Cool	Explosives by 8330A		
				CWM	4 oz	Cool	TAL Metals 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler - Shaw	Date: 5/19/09 Time: 1800	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 5/21/09 Time: 9:30	2. Received by: Accutest	Date: 5/21/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.4

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65374 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/21/09 9:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 4.4

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8672 3651 1937

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
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- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE CL 5/21/09 TECHNICIAN SIGNATURE/DATE E.T. 5.21.09

ASBD 12/17/07

F65523

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW05 27 09ACCT

PAGE 1 OF 1

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Project Name/No: PBOW
Sample Team Member: David Kessler
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Ash pit 3
Required Report Date: 21 DAYS

Sample Shipment Date: 5-27-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 1946

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP2011	Surface Water	5-27-09 1310	2 - Amber	1 L	Cool	Explosives by 8330A		
				~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330A~~		
				~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330A~~		
2	PRRW-001	Water	5-27-09 1440	2-Amber	1L	Cool	Explosives by 8330		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: David Kessler-Shaw	Date: 5-27-09 Time: 1630	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: Time: 5/28/09 9:30	2. Received by: [signature] / Accutest	Date: 5/28/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

3.6

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F65523 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 5/28/09 9:30 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 3.6

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8684 4331 1946

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OF LAB FILTERED METALS ? Ø

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE Clk 5/28/09 TECHNICIAN SIGNATURE/DATE E.T.S. 5/29

ASBD 12/17/07

Job Change Order: F65523_6/1/2009

Requested Date:	6/1/2009	**Received Date:**	5/28/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	6/18/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #:
F65523-2

PRRW-001

Change: Client notified: sample looks like motor oil, it stains everything orange and it is black going through the filter. Lab will only use 100mls for 8330 prep. RLs will be about 10X without any dilution

Sample #:
F65523-2

PRRW-001

Change: Per Eddie Weaver @ Shaw via phone 06.02.09, HOLD sample that is left after 8330 is extracted for maybe future analysis.

Sample #:
F65523-2

PRRW-001

Change: Split 1 liter into 500mls for TAL Metals (preserved 06.02.09) and other 500ml for AB8270TCL: Per Eddie via phone.

Above Changes Eddie Weaver @ Shaw **Date:** 6/1/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

F67482

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 20 09ACCT

PAGE 2 OF 4

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132458 (PRRWP)
Required Report Date: 21 DAYS

Sample Shipment Date: 08/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8692 9696 3896

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	PR0050	SOIL	8-18-20/1340	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
2	PR 0051	SOIL	8-18-20/1418	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
3	PR0052	SOIL	8-18-20/1505	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
4	PR0053	SOIL	8-18-20/1610	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
5	PR0054	SOIL	8-18-20/1610	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
4	PR0053-MS	SOIL	8-18-20/1610	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
4	PR0053-MSD	SOIL	8-18-20/1610	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
6	PR0056	SOIL	8-18-20/1648	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
7	PR0057	SOIL	8-19-20/0807	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 8/20/09 Time: 1130	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: 8.21.09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.6

F67482

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 20 09ACCT

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132458 (PRRWP)
Required Report Date: 21 DAYS

Sample Shipment Date: 8/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8692 9696 3896

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8	PR0058	SOIL	8-19/20/0836	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
9	PR0059	SOIL	8-19-20/0900	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
10	PR0060	SOIL	/0945	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
11	PR0061	SOIL	/1053	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
12	PR 0068	SOIL	/1128	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
13	PR 0062	SOIL	/1304	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
14	PR 0063	SOIL	/1328	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
15	PR 0072	SOIL	/1359	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
16	PR0065	SOIL	/1427	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature] Date: 8/20/09 Time: 1130
2. Relinquished by: [signature] Date: ___ Time: ___
3. Relinquished by: Date: ___ Time: ___

1. Received by: [signature] Date: ___ Time: ___
2. Received by: [signature] Date: 8-21-09 Time: 0900
2. Received by: [signature] Date: ___ Time: ___

Comments:

P67482

Shaw™
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 20 09ACCT

PAGE 4 OF 4

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132458 (PRRWP)
Required Report Date: 21 DAYS

Sample Shipment Date: 8/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8692 9696 3896

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
17	PR0066	SOIL	8-19-20/1427	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
18	PR0064	SOIL	/1451	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
19	PR0071	SOIL	/1522	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
20	PR0070	SOIL	/1553	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
21	PR0073	SOIL	/1628	Wide Mouth Glass Jar	4 oz	Cool	Explosives by 8330		
	~~SOIL~~	CPS		~~Wide Mouth Glass Jar~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330~~		
	~~SOIL~~	CPS		~~Wide Mouth Glass Jar~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330~~		
	~~SOIL~~	CPS		~~Wide Mouth Glass Jar~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330~~		
	~~SOIL~~	CPS		~~Wide Mouth Glass Jar~~	~~4 oz~~	~~Cool~~	~~Explosives by 8330~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: CPS	Date: 8/20/09 Time: 1130	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: [signature]	Date: 8/21/09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4°C

F67482

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 20 09ACCT

PAGE 1 OF 4

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 (Ash Pit 3)
Required Report Date: 21 DAYS

Sample Shipment Date: 08/20/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8642 9696 3896

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
22	AP0032	SOIL	8/19/09 1355	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				1-Wide Mouth Glass Jar	4 oz	Cool	TOC by Walkley-Black		
23	AP0033	SOIL	8/19/09/1425	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
24	AP0036	SOIL	8/19/09/1540	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
25	AP0037	SOIL	8/19/09/1550	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	AP0040MS	SOIL	8/19/09/1655	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	AP0040MSD	SOIL	8/19/09/1655	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
27	AP0039	SOIL	8/19/09/1655	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082	CPS	

Special Instructions:

Possible Hazard Identification:
Non-haz: X Flammable: Poison B: Unknown:

Sample Disposal:
Return to Client: Disposal by Lab: X Archive:

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X SR, 8/20/09 Project Specific:

1. Relinquished by: [signature] Date: ~~8/19/09~~ Time: 1130
1. Received by: FX Date: Time:
2. Relinquished by: FX Date: Time:
2. Received by: J. Cone / (ACCUTEST) Date: 8.24.09 Time: 09:00
3. Relinquished by: Date: Time:
2. Received by: Date: Time:

Comments:

S.8

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F67482 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 8-21-09 09:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 4.6

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8692 9696 3896

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OF LAB FILTERED METALS ? 0

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE E.T.P. 2109 TECHNICIAN SIGNATURE/DATE CLR 8/21/09

ASBD 12/17/07

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F67482 CLIENT: SHAW PROJECT: PBOW

DATE/TIME RECEIVED: 8-24-09 09:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 5.8

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8084 2331 0803

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? _____

NUMBER OF 5035 FIELD KITS ? _____

NUMBER OF LAB FILTERED METALS ? _____

SUMMARY OF COMMENTS: SAMPLES FOR COC (1-4) RECEIVED 8-24-09 COC #1

TECHNICIAN SIGNATURE/DATE JC 8-24-09 TECHNICIAN SIGNATURE/DATE _____

ASBD 12/17/07

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 21 09TA

PAGE 1 OF 2

Project Name/No: PBOW
Sample Team Member: Mke Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 (Ash Pit 3)
Required Report Date: 21 DAYS

Sample Shipment Date: 8/21/09
Laboratory Destination: Test America
Laboratory Contact: Lois Ezzo
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8639 8124 1228

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
AP0060	Soil	8/21/09 0920	Wide Mouth Glass Jar	~~2X4oz~~ 2x8oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~4oz~~	Cool	Explosives by 8330A		
AP0057	Soil	8/21/09 1330	Wide Mouth Glass Jar	~~2X4oz~~ 2x8oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~4oz~~	Cool	Explosives by 8330A		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: C. [illegible] Date: 8/21/09 Time: 1400
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: [illegible] TA/NC Date: 8/22/09 Time: 10:00am
2. Received by: Date: Time:
2. Received by: Date: Time:

Comments:

TestAmerica Cooler Receipt Form/Narrative **Lot Number:** AGH220159
North Canton Facility

Client Shaw E&I Project PBAW By: [signature]
Cooler Received on 8/22/09 Opened on 8/22/09 (Signature)
FedEx ☒ UPS ☐ DHL ☐ FAS ☐ Stetson ☐ Client Drop Off ☐ TestAmerica Courier ☐ Other _____
TestAmerica Cooler # _____ Multiple Coolers ☐ Foam Box ☐ Client Cooler ☒ Other _____

1. Were custody seals on the outside of the cooler(s)? Yes ☒ No ☐ Intact? Yes ☒ No ☐ NA ☐
   If YES, Quantity 2 Quantity Unsalvageable _____
   Were custody seals on the outside of cooler(s) signed and dated? Yes ☒ No ☐ NA ☐
   Were custody seals on the bottle(s)? Yes ☐ No ☒
   If YES, are there any exceptions? _____
2. Shippers' packing slip attached to the cooler(s)? Yes ☒ No ☐
3. Did custody papers accompany the sample(s)? Yes ☒ No ☐ Relinquished by client? Yes ☒ No ☐
4. Were the custody papers signed in the appropriate place? Yes ☒ No ☐
5. Packing material used: Bubble Wrap ☒ Foam ☐ None ☐ Other _____
6. Cooler temperature upon receipt 2.8 °C See back of form for multiple coolers/temps ☐
   METHOD: IR ☒ Other ☐ _____
   COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐
7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Could all bottle labels be reconciled with the COC? Yes ☒ No ☐
9. Were sample(s) at the correct pH upon receipt? Yes ☐ No ☐ NA ☒
10. Were correct bottle(s) used for the test(s) indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Sufficient quantity received to perform indicated analyses? Yes ☒ No ☐
13. Was a trip blank present in the cooler(s)? Yes ☐ No ☒ Were VOAs on the COC? Yes ☐ No ☒

Contacted PM _____ Date _____ by _____ via Verbal ☐ Voice Mail ☐ Other ☐
Concerning _____

14. CHAIN OF CUSTODY

The following discrepancies occurred:

_____

15. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in Sample Receiving to meet recommended pH level(s). *Nitric Acid Lot# 031909-HNO_3; Sulfuric Acid Lot# 100108-H_2SO_4; Sodium Hydroxide Lot# 100108 -NaOH; Hydrochloric Acid Lot# 092006-HCl; Sodium Hydroxide and Zinc Acetate Lot# 050205-$(CH_3COO)_2ZN/NaOH$.* What time was preservative added to sample(s)? _____

Client ID	pH	Date	Initials

F67519

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 21 09ACCT

PAGE 1 OF 2

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 (Ash Pit 3)
Required Report Date: 21 DAYS

Sample Shipment Date: 8/21/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 0814

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884
Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	AP0048	SOIL	8-20-09/1530	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
2	AP0049	SOIL	8-20-09/1540	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
3	AP0061	SOIL	8-20-09/1645	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
4	AP0051	SOIL	8-21-09/0905	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	~~AP0060~~ EW	SOIL	~~8-21-09/0900~~	~~2-Wide Mouth Glass Jar~~	~~8 oz~~	Cool	~~Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082~~		
5	AP0059	SOIL	8-21-09/0920	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
6	AP0052	SOIL	8-21-09/0920	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
7	AP0042	SOIL	8-21-09/1020	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
8	AP0043	SOIL	8-21-09/1030	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 8/21/09 Time: 1400	1. Received by:	Date: Time:
2. Relinquished by:	Date: Time:	2. Received by:	Date: 8-22-09 Time: 0900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

2.8

F67519

Shaw™
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB08 21 09ACCT

PAGE 2 OF 2

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 (Ash Pit 3)
Required Report Date: 21 DAYS

Sample Shipment Date: 8/21/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684 4331 0814

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9	AP0045	SOIL	8-21-09/1115	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
10	AP0046	SOIL	8-21-09/1126	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
11	AP0054	SOIL	8/21/09 1330	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
12	AP0055	SOIL	8/21/09 1345	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
13	AP0056	SOIL	8/21/09 1330	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 8/21/09 Time: 1400	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: Time:	2. Received by: Accutest	Date: 8-22-09 Time: 1800
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 2.8

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F67519 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 8-22-09 10:00 # OF COOLERS RECEIVED: 1 COOLER TEMPS: 2.8

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8694 4331 0814

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE RECEIVED IN COOLER

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

SAMPLE INFORMATION

- [ ] SAMPLE LABELS NOT PRESENT ON ALL BOTTLES
- [ ] CORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] TIMES ON COC DOES NOT MATCH LABEL(S)
- [ ] ID'S ON COC DOES NOT MATCH LABEL(S)
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING INSTRUCTIONS
- [ ] UNCLEAR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT NOT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OF LAB FILTERED METALS ? 0

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE E.T. 8-22-09 TECHNICIAN SIGNATURE/DATE CR 8/22/09

ASBD 12/17/07

F69338

ANALYSIS R EST AND CHAIN-OF-CUS TODY RECORD

REFERENCE COC NO.: PWM 1106 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6
5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~B~~ 1106 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076-MSD	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/06/09 Time: 1430	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/7/09 Time: 930	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0
4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWM 11061 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 LB3076-MS	WATER	11/5/09 0930	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 930	2. Received by:	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 1106 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 172457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 RC3084	WATER	11-5-09 0830	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ 62		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E W Weaver	Date: 11-6-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 06 09ACCT

PAGE ____ OF ____

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 AP3073	WATER	11-6-09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
4 Trip Blank (prepared by lab)	WATER	11-6-09 1130	3 VOA Vial	40ml	HCL	VOCs by 8260		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: Eddie W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: Fx	Date: Time:
2. Relinquished by: Fx	Date: 11/7/09 Time: 930	2. Received by: Cl Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW16 1106 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5 AP3070	WATER	11/4/09 1700	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/7/09 Time: 9:30	2. Received by: Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWM11 06 09ACCT

PAGE 1 OF 2

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6	LB 3077	WATER	11/5/09 0930	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	500 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	LB 3080	WATER	11/3/09 1610	3 VOA Vial	40ml	HCL	VOCs by 8260		
				~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
				~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
				~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
				~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
				~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
				~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
				~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
1	LB 3076-MSD		11/5/09 0930	3 VOA Vial	40 ml	HCL	VOCs by 8260		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/7/09 Time: 930	2. Received by: [signature] / Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW16 06 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 LBA-ER-1109	WATER	11-4-09 1645	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1450	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 06 09ACCT

PAGE ___ OF ___

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
11 LBA-ER 1109	WATER	11-4-09 1700	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
7 WWTP1-ER 1109	WATER	11-4-09 1645	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: C. [illegible]	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Clark/Accutest	Date: 11/7/09 Time: 9:30
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 3.0

P69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member:
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 133767
Required Report Date: 21 DAYS

Sample Shipment Date:
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 DI-Water-BLK1	WATER	11-4-09 1630	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/6/09 Time: 1430	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/9/09 Time: 930	2. Received by:	Date: 11/9/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW18 1106 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 DI-Water BLK1	WATER	11-4-09 1630	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EKL		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1436	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 9:30	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 06 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 RC3084	WATER	11-5-09 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
9 BEDGW-001-ER1	WATER	11-6-09 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: K

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 06 09ACCT

PAGE ___ OF ___

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 BEDGW-001-ER1	WATER	11-6-09 0830	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: C. W. Weaver	Date: 11-6-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 9:30	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

A69338

PW1106

REFERENCE COC NO.: ~~PB10~~ 09ACCT

PAGE 2 OF 2

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	LB3076-MS	water	11/5/09 0930	3 VOA vial	40 ml	HCL	VOCs by 8260		
1	LB3076	↓	11/5/09 0930	↓	↓	↓	↓		
	LB3075	↓	11/4/09 0945	↓	↓	↓	↓		
10	AP3071	↓	11/6/09 0920	↓	↓	↓	↓		
5	AP3070	↓	11/4/09 1700	↓	↓	↓	↓		
12	AP3072	↓	11/6/09 0830	↓	↓	↓	↓		
13	trip blank	water	11/3/09 1200	3 VOA vial	40 ml	HCL	VOCs by 8260		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 06 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
10 AP3071	WATER	11/6/09 0920	~~3 VOA Vial~~	~~40ml~~	~~HCL~~ CB	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~CB~~	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
			CB					

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: CB	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: CAR/Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: EW PW10 06 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-6-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
11 LBA-ER-1109	WATER	11-4-09 1700	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: [signature] Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

F69338

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~08~~ 1106 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/6/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.:

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
12 AP3072	WATER	11/6/09 0830	~~3 VOA Vial~~	~~40ml~~	~~HCL~~ CB	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~ CB		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~ CB			~~6 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		
		CB						

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: CB	Date: ~~CB~~ 11/6/09 Time: 1430	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/7/09 Time: 930	2. Received by: Accutest	Date: 11/7/09 Time: 930
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F69338 CLIENT: Shaw PROJECT: 132457

DATE/TIME RECEIVED: 11/07/09 930 {MM/DD/YY 24:00} NUMBER OF COOLERS RECEIVED: 12

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8684 4331 1968

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [x] TRIP BLANK PROVIDED
- [ ] TRIP BLANK NOT PROVIDED
- [ ] TRIP BLANK NOT ON COC
- [x] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [x] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? Ø

NUMBER OF 5035 FIELD KITS ? Ø

NUMBER OR LAB FILTERED METALS ? Ø

TEMPERATURE INFORMATION

- [ ] IR THERM ID IR#1 CORR. FACTOR +.4
- [ ] OBSERVED TEMPS: 3.6 3.8 4.6 4.2 2.8 3.0 3.2 4.6 4.4 3.8 2.6 1.6
- [ ] CORRECTED TEMPS: 4.0 4.2 5.0 4.6 3.2 3.4 3.6 5.0 4.8 4.2 3.0 2.0

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [x] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [x] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

{APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS}

SUMMARY OF COMMENTS: Recieved 2 trip Blanks 1 not on coc Did not recieve 3 vials labeled for samples: LB3080 @ 11/3/09 1610 LB3075 @ 11/4/09 945 ~~AP3070 @ 11/4/09 1700~~ Sample 7 on coc says LBA-ER-1109 @ 11/4/09 1645 Bottles says WWTP1-ER-1109 @ 11/4/09 1645 Turbidity recieved out of hold.

TECHNICIAN SIGNATURE/DATE 11/7/09 REVIEWER SIGNATURE/DATE E 7-11-09

Job Change Order: F69338_11/9/2009

Requested Date:	11/9/2009	**Received Date:**	11/7/2009
Account Name:	Shaw E & I, Inc.	**Due Date:**	11/23/2009
Project Description:	PBOW	**Deliverable:**	FULT1
CSR:	SB	**TAT (Days):**	14

Sample #: F69338-Trip Blank (second one)	**Change:**	Only one Trip Blank is listed for analysis on the coc, per Eddie Weaver @ Shaw via e-mail 11.10.09, analyze both sets.
Sample #: F69338-LB3080	**Change:**	Sample LB3080 @ 11.03.09, 1610 is listed on the coc for VOCs 8260 but no vials were received. Should have received this sample and paperwork in the previous shipment. Per Eddie
Sample #: F69338-LB3080	**Change:**	This sample was inadvertently left on paperwork received on 07-NOV-09. Per Eddie Weaver @ Shaw via e-mail 11.10.09
Sample #: F69338-LB3075	**Change:**	Sample LB3075 @ 11.04.09, 0945 is listed on the coc for VOCs 8260 but no vials were received. Should have received this sample and paperwork in the previous shipment. Per Eddie.
Sample #: F69338-LB3075	**Change:**	This sample was inadvertently left on paperwork received on 07-NOV-09. Eddie Weaver @ Shaw via e-mail 11.10.09
Sample #: F69338-7 WWTP1-ER1109	**Change:**	The bottles for sample had the same collection time, but were labeled LBA-ER-1109. Per Eddie Weaver @ Shaw via e-mail 11.10.09, change the LBA-ER-1109 to read WWTP1-ER1109.

Above Changes Eddie Weaver @ Shaw **Date:** 11/9/2009

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member:
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133707~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1 SL3096	WATER	11-10-09 1240	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/12/09 9:00 Time: 9:00	2. Received by: Carl / Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.04.4 4.2 3.0 3.8 2.0 2.4 5.05.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 11 09ACCT

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Shaw™

Shaw E & I, Inc.

Sample Team Member:
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133707~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 SL3095MSD	WATER	11-10-09 / 1240	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
1 SL3096	WATER	11-10-09 / 1240	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush:

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eddie Weaver	Date: 11-11-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/12/09 Time: 900	2. Received by: Accutest	Date: 11/12/09 Time: 900
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 11 09ACCT

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Shaw™

Shaw E & I, Inc.

Sample Team Member: EW
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133707~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 SL3095	WATER	11-10-09 1240	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
2 SL3095MS	WATER	11-10-09 1240	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: E.W. Weaver	Date: / Time:	1. Received by: FX	Date: / Time:
2. Relinquished by: FX	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: / Time:	2. Received by:	Date: / Time:

Comments: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW10 4 09ACCT

PAGE 1 OF

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8604-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
SL3095MSD	WATER	11-10-09 1240	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~SL3096~~ EW	WATER	~~11-10-09~~ EW ~~1240~~	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: Eddie W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/12/09 Time: 9:00	2. Received by: OR/Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4044.23.03.82.02.45.05.24.648

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1 11 09ACCT

PAGE 1 OF

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 SL3095	WATER	11-10-09 / 1240	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~SL3095MS~~ EW	WATER	~~11-10-09~~ EW ~~1240~~	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/12/09 Time: 9:00	2. Received by: Clk / Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW16 11 09ACCT

PAGE 1 OF

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
2 SL3095MS	WATER	11-10-09 1240	~~3 VOA Vial~~	~~40ml~~	HCL	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER EW		3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: FX	Date: Time:
2. Relinquished by: FX	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

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ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWM 1111 09ACCT

PAGE 1 OF 2

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
3 SL3092	WATER	11/10/09 0945	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/11/09 Time: 1530	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~X~~ /111 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 2684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
4 SL3090	WATER	11/9/09 1210	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~CRS~~	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/11/09 Time: 1530	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 N 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member: EW
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133767~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
5 DI-Water-BLK 2	WATER	11-9-09 1725	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
~~WATER~~		EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/12/09 Time: 9:00	2. Received by:	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW~~M~~ 11 11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Testing Program	Condition on Receipt	Disposal Record
6 SL-ER1109	WATER	11/10/09 1330	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	~~WATER~~		~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/11/09 Time: 1530	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.4 4.2 3.0 3.8 2.0 2.9 5.0 5.2 4.6 4.8

F69 & L6

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member: EW
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~13370~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 6694-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 API-ER1109	WATER	11-9-09 1645	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	~~Explosives by 8330~~		
			1 - HDPE	500 mL	~~HNO3~~	Total TAL Metals by 6010B/7470A		
			1 - HDPE	~~500 mL~~	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	~~TCL SVOCs by 8270C~~		
			1 - HDPE	125 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: EW Weaver	Date: 11-11-09 Time: 1200	1. Received by: [illegible]	Date: Time:
2. Relinquished by: [illegible]	Date: 11/12 [illegible] Time: 9:00	2. Received by: [illegible] Accutest	Date: 11/12 [illegible] Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PWK 1111 09ACCT

PAGE 1 OF 1

Shaw™
Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
8 SL 3091	WATER	11/10/09 1115	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
			~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~Explosives by 8330~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			~~1 - HDPE~~	~~500 mL~~	~~HNO3~~	~~Dissolved TAL Metals by 6010B/7470A~~		
			~~2 - Amber~~	~~1 L~~	~~Cool~~	~~TCL SVOCs by 8270C~~		
			~~1 - HDPE~~	~~500 mL~~	~~H2SO4~~	~~Nitrate~~		
			~~1 - HDPE~~	~~500 mL~~	~~NaOH~~	~~Cyanide by 9010/9012~~		
			~~1 - HDPE~~	~~1 L~~	~~Cool~~	~~Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride~~		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: ___

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by:	Date: 11/11/09 Time: 1530	1. Received by:	Date: Time:
2. Relinquished by:	Date: 11/12/09 Time: 9:10	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F64416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: EW PW16 11 09ACCT

PAGE 1 OF

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1929

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7 AP3074	WATER	11-10-09 0855	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	EW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

4.0 4.1 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW1~~0~~ GW 1 11 09ACCT

PAGE 1 OF

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 AP3074	WATER	11-10-09 0855	~~3 VOA Vial~~	~~40ml~~	~~HCL~~	~~VOCs by 8260~~ EW		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	Total TAL Metals/Hardness by 6010B/7470A		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
	WATER	GW	3 VOA Vial	40ml	HCL	VOCs by 8260		
			2 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	500 mL	HNO3	~~Total TAL Metals/Hardness by 6010B/7470A~~		
			1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
			1 - HDPE	500 mL	H2SO4	Nitrate		
			1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
			1 - HDPE	1 L	Cool	Turbidity, Alkalinity, ~~TDS, TSS~~, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:

Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:

Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:

Normal: X Rush: ___

Level of QC Required:

Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver	Date: 11-11-09 Time: 1200	1. Received by: [illegible]	Date: Time:
2. Relinquished by: [illegible]	Date: 11/12/09 Time: 9:30	2. Received by: [illegible] Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 4.0 4.4 4.23.0 3.82.0 2.45.0 5.2 4.4 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PW11 11 09ACCT

PAGE 1 OF 1

Shaw™

Shaw E & I, Inc.

Sample Team Member: EW
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: ~~133767~~ 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11-11-09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8684-4331-1979

Bill To: Accounting
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
7	AP1-ER1109	WATER	11-9-09 1645	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	125 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		
5	DI-Water-Blank2	WATER	11-9-09 1725	3 VOA Vial	40ml	HCL	VOCs by 8260		
				2 - Amber	1 L	Cool	Explosives by 8330		
				1 - HDPE	500 mL	HNO3	Total TAL Metals by 6010B/7470A		
				1 - HDPE	500 mL	HNO3	Dissolved TAL Metals by 6010B/7470A		
				2 - Amber	1 L	Cool	TCL SVOCs by 8270C		
				1 - HDPE	125 mL	H2SO4	Nitrate		
				1 - HDPE	500 mL	NaOH	Cyanide by 9010/9012		
				1 - HDPE	1 L	Cool	Turbidity, Alkalinity, TDS, TSS, Sulfate, Chloride		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: [signature]	Date: 11-11-09 Time: 1200	1. Received by: [signature]	Date: Time:
2. Relinquished by: [signature]	Date: 11/12/09 Time: 9:00	2. Received by: [signature] Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:
4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

F69416

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PBW 1111 09ACCT

PAGE 2 OF 2

Shaw™

Shaw E & I, Inc.

Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457
Required Report Date: 21 DAYS

Sample Shipment Date: 11/11/09
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 9684-4331-1979

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
6	SL-ER1109	water	11/10/09 1330	3 VOA vial	40ml	HCL	VOCs by 8260		
8	SL3091	water	11/10/09 1115	↓	↓	↓	↓		
4	SL3090	water	11/9/09 1210	↓	↓	↓	↓		
10	trip blank	water	11/11/09 1530	2 VOA vial	↓	↓	↓		

CPS

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: CPS	Date: 11/11/09 Time: 1530	1. Received by: fx	Date: Time:
2. Relinquished by: fx	Date: 11/12/09 Time: 9:00	2. Received by: Accutest	Date: 11/12/09 Time: 9:00
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments: 1 cooler

4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F09416 CLIENT: Shaw PROJECT: 132457

DATE/TIME RECEIVED: 11/12/09 9:00 {MM/DD/YY 24:00} NUMBER OF COOLERS RECEIVED: 11

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8684 4331 1979

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [x] TRIP BLANK PROVIDED
- [ ] TRIP BLANK NOT PROVIDED
- [ ] TRIP BLANK NOT ON COC
- [x] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [x] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 0

NUMBER OF 5035 FIELD KITS ? 0

NUMBER OR LAB FILTERED METALS ? 0

TEMPERATURE INFORMATION

- [ ] IR THERM ID Ie#1 CORR. FACTOR +.4
- [ ] OBSERVED TEMPS: 3.6 4.0 3.8 2.6 3.4 1.6 2.0 4.6 4.8 4.2 4.4
- [ ] CORRECTED TEMPS: 4.0 4.4 4.2 3.0 3.8 2.0 2.4 5.0 5.2 4.6 4.8

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

{APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS}

SUMMARY OF COMMENTS: Samples: 3,4,5,7 & 9 recieved turbidity at of hold

TECHNICIAN SIGNATURE/DATE [signature] 11/12/09 REVIEWER SIGNATURE/DATE [signature] 11-12-09

APPENDIX L

COMMENTS AND RESPONSES

REPONSE TO COMMENTS
OHIO ENVIRONMENTAL PROTECTION AGENCY
ASH PIT 1 and ASH PIT 3
SITE CHARACTERIZATION REPORT
FORMER PLUM BROOK ORDNANCE WORKS, SANDUSKY, OHIO
(Report dated July 2010)

Reference: Comments from Paul Jayko, email dated 24 September 2010.

Comment 1: Ohio EPA will have no comments on this report.

Response 1: Noted.

APPENDIX B

ASH PIT NO. 1 BHHRA

Shaw® a world of Solutions™

Final
August 2011

Baseline Human Health Risk Assessment
Ash Pit 1

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps
of Engineers
Nashville District

FUDS Project No. G05OH001821

C:\standard\covers\PlumBrook\089.cdr(lhall)

Final
August 2011

Baseline Human Health Risk Assessment
Ash Pit 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

FUDS Project No.
G05OH001821

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August 23, 2011

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Submittal of the Final Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment Ash Pit 1 Former Plum Brook Ordnance Works, Sandusky, Ohio Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 Shaw is pleased to submit the Final Baseline Human Health Risk Assessment and the Final Screening Level Ecological Risk Assessment for Ash Pit 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. These reports were prepared consistent with those prepared for other PBOW sites, the agreements among the PBOW project delivery team members, and specifically the respective Ash Pit 1 Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment work plans. Responses to comments received on the draft risk assessment reports have been incorporated into the final reports and are attached to these documents. Please note that the draft risk assessment reports included the respective human health and ecological risks associated with Ash Pit 1 and Ash Pit 3. Per U.S Army Corps of Engineers request, we have separated these ash pit areas into separate reports. The Ash Pit 3 risk assessments will be submitted once the groundwater data have been collected for this site.

Enclosed for your records are four copies of these reports. Copies have also been sent to those on the distribution list as indicated for their review. As requested, the document was sent to the Center of Expertise and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

for

Steven T. Downey, PE, PMP
Project Manager

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Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-R

Project Description: Human Health Risk Assessment for Ash Pit 1 Remedial Investigation
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 11000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
☐	Report		**Document Status**
X	Risk Assessment / Evaluation	Baseline Human Health Risk Assessment Report	☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
☐	Other:		☐ Other:

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Baseline Human Health Risk Assessment

Ash Pit 1 Plum Brook Ordnance Works
Sandusky, Ohio

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FUDS Project No. G0OH001821
Shaw Project No. 132457

August 2011

Final

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List of Acronyms

ABS	dermal absorption factor
AF	soil-to-skin adherence factor
AP1	Ash Pit 1
bgs	below ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentration
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDI	chronic daily intake
cm/hour	centimeters per hour
cm^2	square centimeter
COPC	chemical of potential concern
CSEM	conceptual site exposure model
°F	degrees Fahrenheit
DA	dose absorbed per unit body surface area per day
D&M	Dames and Moore, Inc.
DM	dry matter
DNT	dinitrotoluene
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EPC	exposure-point concentration
ET	exposure time
FI	fractional term
GAF	gastrointestinal absorption factor
gpm	gallons per minute
g	gram
g/kg-day	grams per kilogram of body weight per day
g/m^3	grams per cubic meter
GSA	General Services Administration
HHEM	human health evaluation manual
HI	hazard index
HQ	hazard quotient
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System

IT	IT Corporation
kg	kilogram
kg/day	kilograms per day
LBA	Locomotive Building Area
LMS	linearized multistage
K_p	permeability coefficient
L/cm^3	liters per cubic centimeter
L/day	liters per day
m^3	cubic meter
m^3/day	cubic meters per day
m^3/hr	cubic meters per hour
m^3/kg	cubic meters per kilogram
m/second	meters per second
MDC	maximum detected concentration
$\mu g/m^3$	micrograms per cubic meter
mg/cm^2	milligrams per square centimeter
mg/cm^2-day	milligrams per square centimeter per day
mg/m^3	milligrams per cubic meter
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
µg/L	micrograms per liter
mg/L	milligrams per liter
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIOSH	National Institute for Occupational Safety and Health
OEPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PBOW	Plum Brook Ordnance Works
PEF	particulate emission factor
PEL	permissible exposure limit
ppm	parts per million
PRG	preliminary remediation goal
QC	quality control

RBSC	risk-based screening concentration
REL	recommended exposure limit
RfC	reference concentration
RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
RSL	regional screening level
SF	cancer slope factor
Shaw	Shaw Environmental, Inc.
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
TWA	time-weighted average
UCL	95th percent upper confidence limit on the arithmetic mean
UF	uncertainty factor
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
WRS	Wilcoxon Rank Sum

Executive Summary

A baseline human health risk assessment (BHHRA) was conducted to evaluate risks associated with exposure to soil, groundwater, surface water and sediment at Ash Pit 1 (AP1) at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The approach used in the BHHRA is consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions and agreements between the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville and Huntington Districts, and Shaw Environmental, Inc.

Site History/Description. The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene, and pentolite. Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts from the mid-1950s until 1963.

Accountability and custody for the entire portion of the former PBOW property that had been under the accountability and custody of the Department of the Army were transferred to the National Aeronautics and Space Administration (NASA) on March 15, 1963. NASA performed further decontamination efforts during 1964. NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status.

Three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal storage area, and an aboveground fuel storage tank. The fuel storage tank was surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. The buildings also contained two to four large coal-burning boilers, a turboelectric generator, a feed

water treatment system, and several steam-driven or electric air compressors. The powerhouses generated steam that was used for space heating, driving compressors, and generating electrical power. Coal ash waste from each of the boilers in the powerhouses was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit." AP1 was associated with Powerhouse 1.

AP1 is located just south of Maintenance Road, approximately 800 feet west of Taylor Road. The topography of AP1 is generally flat, sloping slightly downward toward the north. Currently, AP1 is largely covered with thickets of trees up to a height of approximately 15 feet. A frequently inundated, low-lying area is located within the northern boundary of AP1. A culvert is located immediately north of AP1, extending under Maintenance Road, which carries runoff from AP1 and Maintenance Road northward under the road and to a ditch on the north side of the road. A larger drainage ditch located west of AP1 contained water that reportedly flowed in a northeast direction. During site visits in October 2008 and April 2009, U.S. Army Corps of Engineers and Shaw personnel observed less than 2 feet of water in this ditch, and it did not appear to be flowing.

Approach. The BHHRA evaluated exposure to chemicals in , surface soil, subsurface soil, bedrock groundwater, overburden groundwater, surface water, and sediment for cancer risks and noncancer hazards. Only validated analytical data were used in the BHHRA. Validated analytical data are from samples collected during 2008 and 2009, as reported in the 2010 site characterization report, and those collected in 1999 and reported in the limited site investigation report.

The standard steps of risk assessment, including data analysis, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis, were executed in the AP1 BHHRA. A screening for chemicals of potential concern (COPC), which is part of the data analysis, was used to focus the evaluation on those chemicals most likely to present a risk to potentially exposed individuals. The protocol established for background screening (a component of COPC screening) of PBOW sites differs from the current Ohio Environmental Protection Agency guidance as described in Section 2.4.3.1 of this report. Each COPC in each medium was evaluated for exposure via the relevant exposure pathways and the resultant risk and hazards were estimated. One or more COPCs were found in each AP1 environmental medium. The receptors listed below were evaluated for exposure to the COPCs and their associated hazards and risks. The media evaluated for each receptor are shown in parentheses.

- Current groundskeeper (surface soil)
- Future groundskeeper (combined surface and subsurface soil [referred to as "total soil"], bedrock groundwater, overburden groundwater)
- Indoor worker (surface soil, subsurface soil [air pathway only], bedrock groundwater, overburden groundwater)
- Construction worker (total soil, surface water, sediment)
- On-site resident (total soil, surface water, sediment, bedrock groundwater, overburden groundwater)
- Hunter (surface soil)
- Hunter's child (surface soil [venison pathway only]).

Note that there is currently no groundskeeper at AP1, but the current groundskeeper is included because current land use does not prohibit the presence of a groundskeeper or other on-site workers. Even though hunting is not currently permitted at AP1, hunting is permitted in other areas within PBOW; therefore, future use of AP1 for hunting is evaluated in this BHHRA. No construction is planned for AP1, but a construction worker is assumed to be potentially exposed under current or future land use. The future groundskeeper, indoor worker, and resident are evaluated for future land use; these three receptors are also evaluated assuming groundwater use as potable water. Overburden groundwater and bedrock groundwater are evaluated for each receptor separately.

Results/Conclusions. Risks were characterized for each COPC identified in each medium for the relevant receptors. Noncancer hazards were evaluated against a target hazard index (HI) criterion of 1 and the PBOW team target incremental lifetime cancer risk (ILCR) of 1E-5 (i.e., 1 additional incidence of cancer per 100,000 individuals exposed). Cancer risk results are also compared to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) acceptable cancer risk range of 1E-6 to 1E-4 (i.e., a rate of 1 additional incidence of cancer per 1,000,000 to 1 in 10,000 individuals exposed), which is referred to herein as the "NCP risk management range."

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk criteria (ILCR>1E-5) are shown as bold and exceedances of the noncancer hazard criterion (HI>1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics:

- Current groundskeeper: ILCR = 5E-6; HI = 0.21
- Future groundskeeper – bedrock groundwater use: ***ILCR = 9E-4; HI = 11***
- Future groundskeeper – overburden groundwater use: ILCR = 2E-6; ***HI = 15***
- Future groundskeeper – excluding groundwater use: ILCR = 2E-6; HI = 0.2 (excluding background-related manganese [inhalation pathway])

- Indoor worker – bedrock groundwater use: ***ILCR = 8E-4; HI = 9***
- Indoor worker – overburden groundwater use: ILCR = 1E-6; ***HI = 13***
- Future indoor worker – excluding groundwater use: ILCR = 1E-6; HI = 0.008

- Construction worker: ILCR = 8E-7; HI = 0.9 (excluding background-related manganese [inhalation pathway])

- Resident – bedrock groundwater use: ***ILCR = 6E-3***; ***child HI = 135***; ***adult HI = 58***
- Resident – overburden groundwater use: ILCR = 9E-6; ***child HI = 82***; ***adult HI = 35***
- Resident – excluding groundwater use: ILCR = 9E-6; child HI = 0.7; adult HI = 0.1
- Hunter: ILCR = 3E-7; HI = 0.0009
- Hunter's child: None of the COPCs are bioaccumulative; risks and hazards are assumed to be de minimis.

The ILCR of the AP1 future groundskeeper, indoor worker, and resident that is hypothetically assumed to use bedrock groundwater as household tap water exceeds the NCP risk management range as well as the PBOW target cancer risk criterion. The HI values of these receptors, if assumed to use either the bedrock or overburden groundwater as a potable source, also exceed the target criterion of 1, indicating that adverse human health risks cannot be regarded as unlikely to occur under these hypothetical scenarios. Cancer risks and noncancer hazards to all other potential AP1 receptors evaluated under current or future land use are within or less than the NCP risk management range, are less than the target HI criterion, and are less than the PBOW cancer risk criterion, indicating that cancer risks are at acceptable levels and adverse noncancer effects are unlikely to occur under potential current scenarios. These conclusions also apply to the future groundskeeper, indoor worker, and resident not assumed to use bedrock or overburden groundwater. Note that even though the current groundskeeper is used to represent a maximum exposure under current potential land use (i.e., NASA control), there does not appear to have been any groundskeeping activities at AP1 during recent decades, except in the extreme northern portion of the site immediately adjacent to Maintenance Road.

The cancer risks and cancer hazards associated with bedrock groundwater are nearly entirely attributable to natural petroleum-related compounds and arsenic. The noncancer hazards associated with overburden groundwater are due to manganese and thallium from upgradient well AP1-MW01 (thallium was detected only in one sample); it is unclear if these concentrations

are due to former site activities. Use of either the overburden or bedrock groundwater is regarded as implausible because of insufficient yield. Additionally, the naturally poor quality of the bedrock groundwater and associated hydrogen sulfide off-gassing make it unsuitable as a potable source. The readily available municipal water supply obviates the need for use of groundwater as a potential source of tap water in the general vicinity of PBOW.

Recommendations. No remedial actions or further investigation of AP1 media are recommended. If the contributions of exposure to groundwater and apparent background-related manganese are duly excluded, none of the AP1 receptors had ILCRs or HIs that exceed the PBOW target criteria or the NCP risk management range. This indicates that the associated environmental media at AP1 are unlikely to pose an unacceptable cancer risk to any receptor and that exposure to these media is unlikely to result in adverse noncancer health effects for any human receptor. Because groundwater use is not regarded as plausible based on insufficient yield in both the overburden and bedrock units, the risks associated with AP1 groundwater are accordingly implausible. The naturally poor quality of the AP1 bedrock groundwater further increases the implausibility of bedrock groundwater use.

It is noted that the screening level ecological risk assessment for AP1 recommends no further investigation or other actions based on ecological concerns. Therefore, no further investigation or other actions are recommended at AP1 based on either human health or ecological receptors.

1.0 Introduction

This baseline human health risk assessment (BHHRA) evaluates potential human health risks associated with exposure to soil, groundwater, surface water, and sediment associated with Ash Pit 1 (AP1) located at the former Plum Brook Ordnance Works (PBOW), Sandusky, Erie County, Ohio. This work is being conducted for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites, managed by the USACE Huntington District, and technically overseen by the USACE Nashville District.

This BHHRA is consistent with U.S. Environmental Protection Agency (EPA) guidance and with the procedures established in the BHHRA for TNT Area A (TNTA) and TNT Area C (TNTC) soil (IT Corporation [IT], 2001a), the BHHRA for groundwater at PBOW (Shaw Environmental, Inc. [Shaw], 2006) and, most specifically, the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009).

In this BHHRA, the term "facility" refers to the entire former PBOW property, and the term "site" refers to areas within PBOW under investigation, in this case AP1.

1.1 Facility Location and Description

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene (DNT), and pentolite (USACE, 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were

designated TNTA, TNT Area B (TNTB), and TNTC. Twelve process lines were used in the manufacture of TNT: four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration (GSA). This transfer did not include the Plum Brook Depot area, which consists of 2,800 acres. The Department of the Army reacquired the 3,230 acres in 1954. In 1955, the Army completed further decontamination of the manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds. The Army continued cleanup efforts until 1963.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; then removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were covered with fill material. All materials, including the soil in those areas, were flashed; the area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc. [D&M], 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John H. Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. This excess included former buffer areas that had not been used by the Army and were thus not subject to decontamination efforts. The Perkins Township Board of

Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The GSA retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the Site Management Plan (USACE, 1995).

1.3 Ash Pit 1 Description and History

As noted previously, PBOW was built in early 1941 and manufactured TNT, DNT, and pentolite until 1945. Three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal storage area, and an aboveground fuel storage tank. The powerhouse buildings also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The powerhouses generated steam that was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the powerhouse was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit" (USACE, 1995). AP1 was associated with Powerhouse 1, and its location is shown on Figure 1-2.

The topography of AP1 is generally flat, sloping slightly toward Maintenance Road, which forms the northern border. During a 2009 site reconnaissance by USACE and Shaw personnel, AP1 was observed to be covered with thickets of trees (primarily gray dogwood [*Cornus racemosa*]) at an average height of approximately 15 feet. NASA informed Shaw/USACE that an underground high-voltage utility line bisected AP1 in a north-south direction and an underground telephone line was present approximately 5 feet south and parallel to Maintenance Road. A culvert under Maintenance Road and an associated drainage ditch approximately 5 feet due north of AP1 were observed. The culvert receives runoff from Maintenance Road, and possibly from AP1, and drains to the north under Maintenance Road. A larger drainage ditch located west of AP1 contained standing water that apparently flows in a northeast direction when heavy precipitation occurs. During site visits in October 2008 and April 2009, USACE and Shaw personnel observed water in this ditch, but it did not appear to be flowing. A low-lying, frequently inundated area was observed in the western portion of AP1, adjacent to the northern boundary. Standing water was also observed in the north edge of AP1 during April 2009 reconnaissance, especially in ruts made by vehicles and other equipment along Maintenance Road. This standing water was not observed during site visits in September or October 2008.

1.4 Groundwater Use and Site Use

Two groundwater aquifer systems are utilized for drinking water in the region: a carbonate aquifer to the west and a shale aquifer to the east (Shaw, 2005). PBOW is located within the transition of the two systems. Upwards of 170 private drinking water wells permitted by the Erie County Health Department are located within 4 miles of PBOW. Groundwater is not used on the PBOW facility. Permits are not required for agricultural wells. The Erie County Health Department does not permit using surface water as private drinking water. A shallow discontinuous and variably saturated groundwater system exists within the unconsolidated material atop the bedrock under much of the site.

Current use of the PBOW facility is classified as industrial for the purpose of identifying plausible human receptors and exposure pathways for evaluation in the BHHRA. D&M (1997) describes potential future uses of all or portions of the facility as follows:

- Industrial use (NASA activities and programs) may continue.
- Portions of the site may be used for recreation by hunters and fishermen.
- Portions of the site may be sold to state or local government or private individuals (no land-use restrictions were mentioned).
- Parts of the facility may be used in the future for residential or agricultural purposes.
- Parts of the facility may be used for training by the National Guard.
- Construction activities may be performed during development of any of the sites.

In summary, future site uses of AP1 are considered to be industrial or residential for the purpose of developing receptor and exposure scenarios. There are no current NASA activities at AP1, but because PBOW is under NASA control, the potential for NASA activities at AP1 exists. Even though hunting is not currently permitted at AP1, hunting is permitted in other areas within PBOW; therefore, future use of AP1 for hunting is evaluated in this BHHRA. It is conservatively assumed for purposes of this BHHRA that groundwater may be developed as a source of potable water in the future. Refer to Section 3.1.3 for a discussion of receptors and exposure scenarios.

1.5 Protocol for the Baseline Human Health Risk Assessment

The BHHRA was performed consistent with the AP1 and Ash Pit 3 BHHRA work plan (Shaw, 2009). The AP1 BHHRA work plan was developed consistent with previous PBOW BHHRAs and is based on EPA, USACE, and Ohio Environmental Protection Agency (OEPA) guidance, including, but not limited to, the following:

- Ohio Environmental Protection Agency (OEPA), 2009a***, Use of U.S. EPA's Regional Screening Levels as Screening Values in Human Health Risk Assessments***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- Ohio Environmental Protection Agency (OEPA), 2009b***, Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for the DERR Remedial Response Program***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- U.S. Army Corps of Engineers (USACE), 1999, ***Risk Assessment Handbook, Volume I: Human Health Evaluation***, Engineer Manual EM 200-1-4.

- U.S. Environmental Protection Agency (EPA), 1989a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

- U.S. Environmental Protection Agency (EPA), 1991a, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors***, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

- U.S. Environmental Protection Agency (EPA), 1992, ***Guidance on Risk Characterization for Risk Managers and Risk Assessors***, Memorandum from F. Henry Habicht II, Deputy Administrator, to Assistant Administrators, Regional Administrators, February.

- U.S. Environmental Protection Agency (EPA), 1997a, ***Exposure Factors Handbook***, Office of Research and Development, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.

- U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

- U.S. Environmental Protection Agency (EPA), 2004a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

- U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.00.05***, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm.

- U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.00.05 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

- U.S. Environmental Protection Agency (EPA), 2010c, ***ProUCL Version 4.00.04 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/038, May.

1.6 Report Organization

The remainder of this document is organized as follows:

- ***Chapter 2.0, Data Evaluation.*** Identifies data sources, evaluates data quality, identifies chemicals of potential concern (COPC), and provides a background screening and evaluation protocol. It is noted that the background screening protocol differs from the current OEPA (2009c) guidance as explained in Section 2.4.3.

- ***Chapter 3.0, Exposure Assessment.*** Presents a conceptual site exposure model (CSEM), including contaminant sources, contaminant release mechanisms, receptors, and exposure pathways; describes exposure-point concentrations (EPC); and presents methods for calculating chemical intake and contact rates.

- ***Chapter 4.0, Toxicity Evaluation.*** Describes the potential for cancer and/or noncancer human health effects, provides an estimate of the quantitative relationship between the magnitude of dose or contact rate and the probability and/or severity of adverse effects, identifies the toxicity values that are used in the BHHRA, and describes the development of dermal toxicity values.

- ***Chapter 5.0, Risk Characterization.*** Combines the output of the exposure assessment and toxicity assessment to quantify the risk to each receptor at each site. Risks associated with exposure to all appropriate media for each site are evaluated.

- ***Chapter 6.0, Uncertainty Analysis.*** Identifies uncertainties in all phases of the BHHRA and discusses their individual effects on the risk assessment results, focusing on those issues that are most likely to have the greatest effect on risk estimates and/or risk management decisions.

- ***Chapter 7.0, Summary, Conclusions, and Recommendations.*** Provides a brief summary of the BHHRA, including quantitative results, uncertainties, and pertinent site information. Summary and discussion is focused on those results and issues that are most likely to directly affect site management decisions. Recommendations of the BHHRA, as well as those of the entire remedial investigation (RI) process, are presented in this section.

- ***Chapter 8.0, References.*** Presents the references used in the preparation of this document.

2.0 Data Evaluation

Data evaluation consists of a description of the appropriate data sources for each environmental medium sampled for AP1, a discussion of data quality, a description of the methodology used for identification of the COPCs, and a summary of the COPCs for each AP1 environmental medium.

2.1 Data Sources

All soil, groundwater, sediment, and surface water samples from which the validated analytical data used in the BHHRA were derived are presented in Table 2-1. These data include surface soil, subsurface soil, overburden groundwater monitoring well samples, bedrock groundwater samples, surface water, and sediment, and overburden and bedrock groundwater monitoring well samples.

The sample summary table identifies each sample used in the BHHRA and the associated analytical suite. Samples included those collected as part of the limited site investigation for AP1 (USACE, 2000), and the RI samples (Shaw, 2010a). All AP1 sampling locations are shown on Figure 2-1.

2.2 Sorting the Analytical Data

Prior to initiation of BHHRA calculations, a database of chemicals present in site samples was compiled for each environmental medium. This database includes all chemicals detected as described in the RI report (Shaw, 2010a) and the limited site investigation report (USACE, 2000). The surface soil and subsurface soil are considered separate media. Surface and subsurface soil data are typically combined to assess exposures under the construction worker, future groundskeeper, and residential site use scenarios, which would likely occur after surface and subsurface soil had been excavated and/or mixed. Combined surface and subsurface soil data are termed “total soil” in the BHHRA. However, it is understood that a reference to the evaluation of exposure to total soil is actually an evaluation of exposure to both surface soil and subsurface soil. The total soil COPC list is created by combining the list of COPCs identified in surface and subsurface soil. If a chemical is either a surface soil COPC or a subsurface soil COPC (or both), then that chemical is a total soil COPC. The EPCs for total soil are typically generated from the combined data sets.

Surface soil is defined as samples collected from within the interval of 0 to 1 foot bgs, and subsurface soil is defined as samples collected from depths greater than 1 foot bgs per the RI work plan (Shaw, 2008a). The limited site investigation (USACE, 2000) historical surface soil

samples were collected from a depth of either 0 to 0.5 or 0.1 foot bgs, or in one case (PBOW99SSA101), at an unspecified depth range near the surface at AP1. The only limited site investigation sample that was collected below a depth of 1 foot bgs (PBOW99SBA103B) was collected at a depth range of 1 to 4 feet bgs. As possible, the RI subsurface soil samples were generally collected at depths of 3 to 5 and 8 to 10 feet bgs at AP1. Where refusal or the water table was encountered before a depth of 10 feet bgs, samples were collected from the deepest 2-foot interval above the water table.

2.3 Evaluation of Data Quality

The quality of the analytical data was evaluated to select data for inclusion in the BHHRA. Data quality is expressed by the assignment of qualifier codes during the analytical laboratory quality control (QC) process or during third-party data evaluation. Some of the more common qualifiers and their meanings are as follows (EPA, 1989a):

U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.

J - Value is estimated, usually below the reporting limit.

N - The analysis indicates an analyte for which there is presumptive evidence to make a tentative identification.

NJ - The analysis indicates a “tentatively identified analyte” and the reported value represents its approximate concentration.

UJ - The analyte was not detected above the reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - QC indicates that the data are unusable (chemical may or may not be present).

B - The concentration in the sample is not sufficiently higher than concentration in the blank, using the 5-times, 10-times (5x, 10x) rule, which states that a chemical is considered a nondetect unless its concentration exceeds 5 times the blank concentration. For common laboratory contaminants (acetone, 2-butanone [methyl ethyl ketone], methylene chloride, toluene, and the phthalate esters), the sample concentration must exceed 10 times the blank concentration to be considered a detection.

“J,” “N,” and “NJ” qualified data are treated in the BHHRA as detected concentrations; “R” data and “B” qualified chemical data are not used. “U” qualified data (nondetects) are treated in the BHHRA as nondetections. The use of data with other, less common qualifiers is evaluated on a

case-by-case basis. Generally, data for which the identity of the chemical is unclear are not used in the BHHRA. If confidence is reasonably high that the chemical is present, but the actual concentration is somewhat in question, the data generally are used in the BHHRA.

Some chemicals may be analyzed under two different analytical programs. For example, the DNT isomers are analyzed by EPA Method 8330 for nitroaromatics as well as EPA Method 8270C for semivolatile organic compounds. Risks associated with the reported values from both analyses are considered in the risk characterization (Chapter 5.0) and discussed as appropriate in the uncertainty analysis (Chapter 6.0), together with potential issues such as the relative sensitivities (i.e., differences in respective reporting limits) of the methods.

2.4 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC screening includes a risk-based screen which also considers status as a human nutrient (Section 2.4.1), a frequency-of-detection evaluation (Section 2.4.2), and a background screen (Section 2.4.3).

2.4.1 Risk-Based Screening

In the risk-based screen, the maximum detected concentration (MDC) of a chemical in a given medium is compared to the appropriate risk-based screening concentration (RBSC) for that chemical and medium. This is performed for each chemical in each medium. The units of the MDC and RBSC are the same for each chemical in a given medium. In groundwater, for example, both the MDC and RBSC have units of micrograms per liter (µg/L) in water.

If the MDC of a chemical is less than or equal to its RBSC, then the chemical is not considered further in the BHHRA for this medium because it is very unlikely that chemical concentrations at or below the RBSC would contribute substantially to risk. An analyte may be identified as a COPC if its MDC exceeds its RBSC. As indicated in Section 2.4, actual status as a COPC also depends on a chemical's frequency of detection (Section 2.4.2), concentration with respect to background (Section 2.4.3), and potential status as a nutrient. Groundwater RBSCs used in the BHHRA are derived from the Oak Ridge National Laboratory–EPA regional screening level (RSL) table "tap water" values, and RBSCs for soil are derived from "residential soil" RSL values (EPA, 2010d). This is a change in the source of the RBSCs for PBOW BHHRA work plans begun prior to March 2009 based on discussion between USACE and OEPA (2009d), and

this change is consistent with recent OEPA (2009a) guidelines. Previously, the groundwater and soil RBSCs were derived from the corresponding EPA (2004b) Region 9 preliminary remediation goals (PRG). The soil RBSCs are applied to both surface and subsurface soil.

RSL values are based on a concentration equal to either an incremental lifetime cancer risk (ILCR) of 1E-6 or a noncancer hazard quotient (HQ) of 1, the threshold at (or below) which adverse noncancer effects are regarded as unlikely to occur. For the BHHRA, the noncancer values listed in the RSL tables are multiplied by a factor of 0.1 to provide additional protection for simultaneous exposure to multiple chemicals (OEPA, 2009a; EPA, 2010d). This results in RBSC values associated with an HQ of 0.1. For cancer risk, the RSL values based on an ILCR of 1E-6 were used directly as RBSCs in the BHHRA. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) identifies acceptable exposure levels that are generally associated with concentration levels that represent an excess upper bound lifetime cancer risk to an individual of 1E-6 to 1E-4 (EPA, 1990). This range is hereinafter referred to as the "NCP risk management range." Cancer risks associated with RSL values represent the lower end of this range. The OEPA recognizes an overall cancer risk of 1E-5, which represents the logarithmic midpoint of the EPA risk management range, as a remedial goal (OEPA, 2009b). The RBSC for a chemical that elicits both cancer and noncancer health effects is selected based on either a cancer risk of 1E-6 or an HQ of 0.1, whichever associated concentration is lower.

Risks associated with exposure to sediment and surface water along the unnamed tributary to Plum Brook to the west of AP1 are also evaluated in the BHHRA. Although RSLs have not been developed specifically for sediment and surface water, RBSCs can be derived from the RSLs based on site conditions at PBOW and the types of exposure to these media that may reasonably be anticipated. The routes by which receptors may be exposed to sediment (i.e., incidental ingestion, dermal contact) are similar to those by which receptors may be exposed to soil. However, sediment contact is expected to be appreciably less intense than soil contact, due to the lower duration and frequency of contact with sediment as compared with soil. Similarly, surface water exposure is expected to be much less intense than exposure to groundwater, as surface water from AP1 is not regarded as a plausible source of drinking water, partly because the Erie County Health Department does not permit using surface water as private drinking water. Consequently, the exposure frequency is expected to be much lower for surface water, and the incidental ingestion of surface water would be much lower than the assumed intentional ingestion and use of groundwater from the tap. For these reasons, OEPA (1999) stated that unadjusted tap water PRG values (i.e., HQ = 1; ILCR = 1E-6) should be used for screening PBOW surface water. This screening protocol was adopted specifically because it was agreed that the magnitude of exposure associated with PBOW surface water exposure would be far less

than that associated with household tap water. In other words, it was agreed that analytes with a maximum concentration at the PRG level would not contribute appreciably to overall risks and hazards for PBOW sites based on the exposure pathways of the surface water exposure scenarios for PBOW. The same agreement was reached for screening sediment against unadjusted residential soil PRGs. This protocol has been updated to base RBSCs on RSLs rather than PRGs. Even though the sediment and surface water RBSCs are an order of magnitude higher for noncarcinogens than the respective soil and groundwater RBSCs, these sediment and surface water RBSCs are regarded as protective of sediment and surface water receptors for screening because of the lower exposure rate to these media. Note that this previously made PBOW Team agreement for screening surface water and sediment (OEPA, 1999), which considered site-specific conditions, takes precedence over current OEPA (2009c) guidance, which simply states that adjusted RSLs (i.e., RBSCs) for soil may be used to screen contaminants in sediment, and those for groundwater may be used to screen surface water. The surface water RBSCs also meet the outside-of-the-mixing-zone average non-drinking water concentrations for the Lake Erie Basin.

The screening of lead in soil and groundwater is a special case. The EPA (2009) Office of Water treatment technique action level of 15 µg/L for lead is listed in the RSL table, and the RSL User's Guide recommends this level for use as an RSL. Lead exposure and risk is evaluated separately from other chemicals using the EPA (2004c) Integrated Exposure Uptake Biokinetic (IEUBK) model. The selection of the action level as the drinking water RSL is based partly on IEUBK model. Section 5.2 of the RSL User's Guide states that if the average tap water concentration exceeds 15 µg/L and the average soil concentration exceeds a value of 250 milligrams per kilogram (mg/kg), then more than the IEUBK target (EPA, 2004c) of 5 percent of the population of exposed children would exceed 10 micrograms per deciliter of lead in blood. Because an RSL of 15 µg/L sufficiently screens for a potential average concentration of 15 µg/L, the RSL of 15 µg/L is used as the RBSC. However, it is possible that the residential soil RSL of 400 mg/kg, which is selected as the soil RBSC, may not screen for an average soil concentration of 250 mg/kg within a given data set. Therefore, the following conditions were placed on the screening of lead: 1) If either the soil RBSC or groundwater RBSC is exceeded, then the IEUBK blood-lead model is run using both average soil and groundwater concentrations, and 2) if the average soil concentration exceeds 250 mg/kg, then the IEUBK model is run, even if neither RBSC is exceeded, using average concentrations of lead in both soil and groundwater. Note that for AP1 total soil, the MDC for lead (27.1 mg/kg) is less than both the RBSC (400 mg/kg) and the criterion for average concentration (250 mg/kg). Likewise, the lead MDC in AP1 overburden groundwater (4.3 µg/L) is less than the RBSC (15 µg/L), and lead was not detected in bedrock groundwater. Therefore, the IEUBK model was not run for AP1 soil and groundwater.

There are no RSLs for sulfate in tap water, but the drinking water outside-of-the-mixing-zone average value of 250 milligrams per liter (mg/L) for the Lake Erie Basin is used as the RBSC. This value is the same as the secondary drinking water regulation of 250 mg/L (EPA, 2009). Secondary drinking water regulations are non-promulgated values, based on aesthetic characteristics, which are used as guidelines for public water systems. A health-based advisory level of 500 mg/L also exists for sulfate (EPA, 2009).

The evaluation of essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required human nutrients. Essential nutrients such as calcium, chloride, iodine, magnesium, phosphorous, potassium, and sodium are generally considered innocuous at levels found in environmental media. There are no RSLs listed for these nutrients. Should any of these chemicals be identified as site related, an exposure analysis is performed whereby a daily dose of chemical from ingestion of the medium in question is calculated. The dose is compared with levels known or expected to be safe or toxic, and/or with recommended daily allowances, depending on the availability of data.

2.4.2 Frequency of Detection

When confidence is high that a given chemical is present, the data generally are used in the BHHRA. For most chemicals, their detection is presumptive evidence of their presence. As suggested by EPA (1989a), chemicals that are reported infrequently may be artifacts in the data that do not reflect the actual presence of the chemical in question. For the BHHRA, chemicals that are reported only at low concentrations in less than 5 percent of the samples from a given medium are excluded from further consideration, unless the presence of a given chemical is expected based on historical information about the site. Chemicals detected infrequently at high concentrations may identify the existence of contaminant plumes or limited “hot spots” and are retained as COPCs.

2.4.3 Comparison to Background

A number of the chemicals detected in PBOW environmental media may have MDCs that exceed RBSCs but are part of normal background concentrations. Such chemicals may include inorganics and polycyclic aromatic hydrocarbons (PAH), a class of organic compounds which form from natural or anthropogenic combustion of organic matter, including fossil fuels, and are generally ubiquitous in the environment. Airborne PAHs associated with non-U.S. Department of Defense sources may be deposited on soil and leach to groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds, as well as PAHs, may also be associated with background concentrations due to the presence of natural petroleum-derived compounds present in the vicinity of PBOW (see Section 3.1.1).

Site concentrations of inorganic chemicals in site environmental media may be compared to those of PBOW background using a two-step approach: 1) background screening and 2) statistical data set testing. This second step (Section 2.4.3.2) is initiated only in cases where the concentration used for background screening is exceeded (refer to Section 2.4.3.1) and is performed after the risk characterization (Chapter 5.0). The results of the statistical data testing are discussed in the uncertainty analysis (Chapter 6.0). No suitable background data set exists for overburden groundwater, so no background screening or statistical comparisons to background concentrations can be made for overburden groundwater samples. Similarly, no background screening or statistical evaluation can be performed for surface water or sediment analytical data, as these media lack PBOW background data sets.

Inorganics and organics are treated similarly from a quantitative perspective. However, all organics not eliminated on the basis of RBSC exceedance (Section 2.4.1) or infrequent detection (Section 2.4.2) are carried through the risk calculation process (exposure assessment, toxicity assessment, and risk characterization). As presented in Section 2.4.3.3, organic compounds are quantitatively eliminated as background related only through the uncertainty analysis if applicable.

2.4.3.1 Background Screening of Inorganics

Background screening is applied to each inorganic whose MDC in soil or limestone bedrock groundwater exceeds the RBSC and that cannot be characterized as an infrequently detected analyte. In background screening, the MDC is compared to the PBOW chemical-specific background screening concentration (BSC). The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998), and the background data set and derivation of BSCs for PBOW bedrock groundwater are described in the 2004 groundwater report (Shaw, 2005). It is noted that the method agreed upon for the development of BSCs, as recorded in the September 11, 2002 PBOW Team Meeting minutes, differs from that shown in current OEPA (2009c) guidance. This PBOW Team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2009c) guidance. Summary tables of the background data sets for soil and groundwater are provided as Tables 2-2 and 2-3, respectively. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Briefly, BSCs were calculated for use at PBOW based on concentrations found in these background soil and bedrock monitoring well samples. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (IT, 1998; Shaw, 2005). The background monitoring well samples were collected using low-flow samples and were unfiltered.

The background screening consists of comparing the MDC of the site data set to the BSC. The chemical may be regarded as a COPC if its MDC exceeds the BSC for that chemical or if no BSC can be determined due to a lack of detections in the background data set. COPCs are fully evaluated in the exposure assessment, toxicity assessment, and risk characterization. An inorganic analyte is not regarded as a COPC if its MDC is equal to or less than the BSC.

2.4.3.2 Statistical Data Set Testing of Inorganics

Statistical testing is performed to compare data sets of site inorganics data against the appropriate PBOW background data sets. As described in Section 2.4.3.1, the background data set for groundwater is presented in the 2004 groundwater report (Shaw, 2005), and the background data set for soil is presented in the site investigation for the acid areas (IT, 1998). As mentioned previously, background data sets do not exist for overburden groundwater, surface water, or sediment; therefore, a statistical background evaluation for COPCs in these media cannot be performed. The method for statistical comparison of the site data sets to the background data sets, described in Appendix M of Shaw (2005), is the Wilcoxon Rank Sum (WRS) statistical test (also known as the Mann-Whitney U test). WRS testing is performed for inorganics having MDCs that exceed the respective BSCs and are identified as COPCs based on RBSC comparison (Section 2.4.1) and frequency of detection (Section 2.4.2). All COPCs are carried through the risk characterization process; thus, statistical testing results are not used to screen out any chemicals.

Site data sets are interpreted as being significantly different from PBOW background if the associated p-level is less than 0.05. WRS statistical output and box-and-whisker plots of the various inorganic COPC data sets are appended to the BHHRA for each inorganic data set evaluated against the appropriate site background data set; the WRS results are discussed as part of the uncertainties. Analytes shown by the WRS results to exceed background (or for which the WRS testing was not run) are assumed to be site related, unless a qualitative chemical-specific explanation is presented in the uncertainties analysis as to why the analyte should not be regarded as site related. The WRS is not run if the COPC was not detected in the PBOW background data set. Data sets for which the WRS results do not suggest site relatedness (i.e., site data and background data are not statistically different) are still evaluated for risks and hazards in the risk characterization (Chapter 5.0).

2.4.3.3 Treatment of Organic Compounds

As mentioned in Section 2.4.3, certain organic compounds (e.g., BTEX and PAHs) in site media may be attributable to background conditions. However, no organic compounds are summarily

screened out. Instead, all detected organic compounds are carried through the risk assessment process (i.e., exposure assessment, toxicity assessment, risk characterization) unless screened out on the basis of comparison to RBSCs (Section 2.4.1) or characterized as infrequently detected (Section 2.4.2). Background contribution of organics are discussed in the uncertainties analysis, as applicable.

2.5 Data Evaluation Summary

Data summary tables are provided for the following media: surface soil (Table 2-4), subsurface soil (Table 2-5), total soil (Table 2-6), bedrock groundwater (Table 2-7), overburden groundwater (wells) (Table 2-8), sediment (Table 2-9), and surface water (Table 2-10). These tables provide the following information for each detected chemical in each environmental medium:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of detection limits
- Arithmetic mean of site concentrations
- 95th percent upper confidence limit on the arithmetic mean (UCL) (for COPCs only)
- Appropriate RBSC
- Appropriate BSC
- Selection/exclusion of chemical as a COPC
- EPC (for COPCs only).

The estimation of the UCL values for COPCs is discussed in Section 3.2.1. For duplicate samples, the associated values are averaged in the data summary, if both samples are detects or if both are nondetects; if only one of the duplicates is a detect, then this detected value is used in the data summary.

An analogous summary table for the overburden groundwater piezometer samples is appended (Appendix A). Note that these direct-push groundwater samples are collected for nature-and-extent purposes to determine groundwater flow direction and the placement of monitoring wells. These data are not sufficiently representative of groundwater conditions for use in risk assessment. Therefore, they are not used to identify COPCs and are not quantitatively evaluated in the BHHRA. This piezometer groundwater summary table is appended only to provide ancillary information.

The COPCs for each of the AP1 media are identified as follows:

- ***Surface Soil*** – Aluminum, beryllium, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene

- ***Subsurface Soil*** – Cadmium, manganese, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene

- ***Total Soil*** – Aluminum, beryllium, cadmium, manganese, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene

- ***Bedrock Groundwater*** –Antimony, arsenic, iron, manganese, thallium, 2-methylnpthalene, naphthalene, benzene, chloroform, chloromethane, ethylbenzene, methylene chloride, 1,1,2,2-tetrachloroethane, toluene, xylenes, cyanide, sulfate

- ***Overburden Groundwater*** – Cobalt, iron, manganese, thallium, chloroform, sulfate

- ***Sediment*** – Arsenic, chromium, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene

- ***Surface Water*** – Arsenic, chromium.

As discussed in Section 2.2, the total soil COPCs include all surface soil and subsurface soil COPCs.

3.0 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989a). An exposure assessment includes the following steps:

- Characterize the physical setting.
- Identify the contaminant sources, release mechanisms, and migration pathways.
- Identify the potentially exposed receptors.
- Identify the potential exposure pathways.
- Estimate exposure concentrations.
- Estimate chemical intakes or contact rates.

The BHHRA characterizes potential exposures to COPCs in AP1 environmental media as portrayed by the CSEM in Section 3.1. Note that these environmental media include soil, groundwater, surface water, and sediment.

3.1 Conceptual Site Exposure Model

The CSEM provides the basis for identifying and evaluating the potential risks to human health in the BHHRA. The CSEM, graphically depicted on Figure 3-1, includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways. This presentation of all possible pathways by which a potential receptor may be exposed, including all sources, release and transport pathways, and exposure routes, facilitates consistent and comprehensive evaluation of risk to human health and helps to ensure that potential pathways are not overlooked. The elements of a CSEM include the following:

- Source
- Source media (i.e., initially contaminated environmental media)
- Contaminant release mechanisms
- Contaminant transport pathways
- Intermediate or transport media
- Exposure media
- Receptors
- Routes of exposure.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium (e.g., ingestion or dermal contact).

The receptors and pathways on Figure 3-1 reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by

D&M (1997) and the sitewide groundwater investigation (IT, 1997). On Figure 3-1, asterisks identify exposure pathways that are complete and addressed in this BHHRA. Justification for exclusion of other pathways is provided in the Figure 3-1 footnotes, and the exclusion of other potential receptors is discussed in Section 3.1.3.8. No current or future exposure by off-site residents is evaluated. Most of the off-site residents are serviced by municipal water from surface water sources. Although there are numerous private groundwater wells in the vicinity, including eight within 1 mile of the facility boundary, none of these is used as a potable source. Based on the investigations of other PBOW sites, natural hydrocarbons and hydrogen sulfide are known to be present within the bedrock limestone, and shale formation groundwater generally provides low yields and is of low quality (e.g., Shaw [2008b]); however, the groundwater underlying AP1 is not summarily excluded for consideration as a tap water source based on natural water quality parameters or general assumptions concerning yield. Therefore, given the presence of numerous off-site wells and the assumption of unrestricted future land use on site, the development of groundwater for on-site residential (or on-site worker) use as tap water is initially regarded as plausible for purposes of this BHHRA. Groundwater quality and potential use is discussed further in the risk characterization (Chapter 5.0) and uncertainty analysis (Chapter 6.0).

3.1.1 Physical Setting

AP1 is vegetated with thickets of trees, mostly grey dogwood (*Cornus racemosa*), at heights of approximately 15 feet. During site reconnaissance, NASA personnel informed USACE and Shaw personnel that an underground, high-voltage utility line bisected AP1 in a north-south direction and an underground telephone line was present approximately 5 feet south and parallel to Maintenance Road.

The following subsections describe the physical setting of AP1, including the climate and meteorology of the Sandusky region (Section 3.1.1.1), and the geology (Section 3.1.1.2), soil (3.1.1.3), hydrology (Section 3.1.1.4), and surface water characteristics (Section 3.1.1.5) of the area and of AP1 in particular. A general description of AP1 is provided in Section 1.3.

3.1.1.1 Climate/Meteorology

The climate in the Sandusky area is continental and strongly affected by Lake Erie. July is generally the warmest month (average high and low temperatures of 82 and 65 degrees Fahrenheit [°F], respectively), and January is generally the coldest (average high and low temperatures of 32 and 19°F, respectively) (The Weather Channel, 2004). On average, the first freezing day (low of 32°F or less) occurs in late October (average of three per month), and the last freezing day falls in early May (average of one per month) (National Oceanic and Atmospheric Administration, 1990). The average annual precipitation for Sandusky is 34.5

inches per year, with a monthly average of more than 3 inches per month falling in April through September and less than 3 inches in each of the other seven months (The Weather Channel, 2004). Precipitation is fairly evenly distributed throughout the year, with the fewest precipitation days (0.01 inch or greater) per month (10) occurring during July, August, September, and October, and the most (15) occurring in December and January (City-Data.com, 2004). The mean annual wind speed is 10.3 miles per hour (City-Data.com, 2004), with winds predominantly from the southwest (Science Applications International Corporation, 1991). Sandusky area winters are cloudy, with 33 percent sunshine during November through February, as compared with to 65 percent sunshine during the summer months (City-Data.com, 2004).

3.1.1.2 Geology

Three formations, all of Devonian Age, outcrop across PBOW, each of which was encountered in the upper 100 feet of bedrock at PBOW (Shaw, 2005). The Delaware Limestone is the lowermost formation screened by site wells. It is characterized as a hard, dense, finely crystalline limestone and dolomite. The unit is typically buff colored and usually is described as fossiliferous. In the vicinity of PBOW, quarries mine limestone from the Delaware. Traces of natural petroleum-derived hydrocarbons and hydrogen sulfide are common in area quarries (Shaw, 2005). Petroleum hydrocarbons were observed during the drilling of AP1 well AP1-BEDGW-001 (Shaw, 2010a); approximately 1 to 2 feet of free product has been found on the surface of this well during sampling. Petroleum hydrocarbons were also found at depth in four of the six bedrock wells in the nearby Locomotive Building Area (LBA) (Shaw, 2010b), indicating the prevalence of petroleum contamination in the bedrock zone within this general area of PBOW. High levels of hydrogen sulfide (more than 200 parts per million [ppm]) were detected in the groundwater during development of AP1 monitoring well AP1-BEDGW-002, and similarly elevated hydrogen sulfide concentrations (more than 200 ppm) were detected in downgradient LBA monitoring well MNTA-BEDGW-001 (Shaw, 2010b).

3.1.1.3 Soils

The bedrock overburden in Erie County is predominantly glacial till, glacial outwash, or glacial lacustrine (lake) deposits. In the vicinity of PBOW, the soil has been interpreted to be lacustrine. In many areas, the overburden also consists of highly weathered bedrock. The thickness of the overburden ranges from less than 1 foot to more than 25 feet. Overburden is thickest on the northern portion of the site in the vicinity of the Reactor Facility Area, where it has filled in a bedrock low (Shaw, 2005). In the AP1 area, the overburden thickness ranges from 21 to 26 feet, based on boring logs.

The soil in the northwest portion of PBOW is placed within the Kibbie-Elnora-Tuscola-Colwood Association, which is described as nearly level to gently sloping. This soil is described as somewhat poorly drained, moderately well drained, and very poorly drained soils formed in outwash, lacustrine, and deltaic sediments. Along a strip from west to northeast across the site is the Castalia-Millsdale-Milton-Ritchey Association. This association is described as shallow to moderately deep, nearly level to moderately steep, well-drained and very poorly drained soils formed in glacial till, lacustrine sediments, and limestone residuum. Across much of the central portion of the site is the Hornell-Fries-Colwood Association, described as moderately deep to deep, nearly level to gently sloping, somewhat poorly drained to very poorly drained soils formed in glacial till and lacustrine sediments over shale bedrock. At the extreme southeast portion of PBOW is the Pewamo-Bennington Association, described as nearly level to gently sloping, very poorly drained and somewhat poorly drained soils formed from glacial till and lacustrine sediments.

3.1.1.4 Hydrology

The two main water-bearing zones at PBOW are located in the overburden/shale unit and the limestone bedrock and are thus called the overburden/shale and bedrock water-bearing zones. The overburden and shale groundwater units show similar water levels in these two units, suggesting substantial vertical communication. Therefore, these two geologic units are combined for purposes of PBOW groundwater evaluation. Data collected during the more recent investigations (Shaw, 2005; IT, 1997, 1999, 2001b) indicate that groundwater in the overburden is in discontinuous pockets during dry time periods. The shallow overburden generally has low yields over most of PBOW due to the high percentage of silt and clay. In contrast, the limestone bedrock water-bearing zone is saturated year round. During periods of low precipitation, only limited migration of contaminants would occur in the overburden due to less infiltration.

Regional groundwater flow in both the overburden/shale and the limestone bedrock is to the north-northeast towards Lake Erie, although local flow may vary due to local topography. The general flow direction in the overburden water-bearing zone is to the north in the immediate vicinity of AP1. A hydrogeological study by the U.S. Geological Survey (1992) conducted in the glacial deposits of Sandusky in 1990 reported a horizontal hydraulic conductivity of 0.046 feet per day and a vertical hydraulic conductivity of 1.2 feet per day.

Water in the limestone typically occurs in joints and along bedding planes or in solutionally enlarged openings. The conceptual model interprets that bedrock groundwater flow in the Delaware Limestone water-bearing zone is influenced by the frequency, orientation, density, and

connectivity of the bedrock fractures. These fractures result in localized groundwater flow direction to the west-northwest in the vicinity of AP1.

At PBOW, the bedrock groundwater has been subdivided into three zones based on location and yield. Zone 1 occurs in the north and northwestern portion of PBOW. It has been characterized as yielding from 100 to 500 gallons per minute (gpm) from karstic limestone approximately 100 feet below grade. Zone 2 is in the northern portion of PBOW and has yields of 15 gpm or less from limestone approximately 300 feet below grade. Zone 3 is located in the eastern and southern portion of the site in predominantly shale bedrock. In addition to being found in the shale, groundwater is located in thin sand and gravel horizons interbedded with silt and clay deposits. Most Zone 3 wells are poor yielding, many of them providing less than 3 gpm (D&M, 1997). AP1 is likely in Zone 2.

3.1.1.5 Surface Water

An unnamed north-to-south tributary to Plum Brook is located just west of AP1, within a ditch that is roughly 10 feet wide and 7 feet deep. Standing water, at a depth of less than 2 feet, has been observed in this ditch. Flow would be south to north during heavy precipitation events, although no flow was observed during field reconnaissance or RI sampling events. A culvert from this ditch passes under Maintenance Road. A low-lying area that is frequently inundated is located along the central part of the northern boundary, adjacent to Maintenance Road. A culvert is located at the extreme north-central part of AP1 along Maintenance Road. This second culvert accepts runoff from Maintenance Road and may also receive some runoff from AP1. During precipitation events, water flows through this culvert under Maintenance Road and into a ditch north of Maintenance Road. This smaller ditch flows into the unnamed north-to-south tributary to Plum Brook mentioned above that is west of AP1. No water was observed in this smaller ditch during field reconnaissance and the RI sampling event.

3.1.2 Contaminant Sources, Release Mechanisms, and Migration Pathways

Contaminant sources, release mechanisms, and migration pathways are summarized on Figure 3-1. Briefly, AP1 received a coal ash slurry via a pipeline from Powerhouse 1. AP1 also received ash from the incinerator at the Waste Water Treatment Plant 3. Depending on specific location, this coal ash layer is present at AP1 from the surface to a depth of up to 2.2 feet. Thus, the coal ash and any contaminants within it may represent surface and subsurface soil.

Leaching and downward migration may have carried contaminants from the subsurface soil to the groundwater. Therefore, exposure to contaminants in groundwater is quantitatively evaluated in the BHHRA. It is possible that surface water and sediment at the nearby unnamed tributary to

Plum Brook may have been impacted by contaminants originating from the AP1 through surface drainage and groundwater migration.

3.1.3 Receptors and Exposure Pathways

Receptors selected to represent the upper bound on exposure from all plausibly exposed groups of people associated with AP1 as well as the pathways by which they may be exposed to chemicals are summarized on Figure 3-1 and in Table 3-1. The exposure variable values used in the contaminant intake models are compiled in Table 3-2. The receptors evaluated in the BHHRA are listed below. Note that the current (Section 3.1.3.1) and future (Section 3.1.3.2) groundskeeper scenarios include different environmental media and are, thus, listed separately. Receptors such as the construction worker, hunter, and hunter's child may be viable under current or future land use. However, the evaluation for these receptors is exactly the same under current and future land use.

- Current groundskeeper
- Future groundskeeper
- Indoor worker (future)
- Construction worker (current/future)
- On-site resident (future)
- Hunter (future)
- Hunter's child (future).

Most BHHRAs are based on a reasonable maximum exposure (RME) assumption. The intent of the RME assumption is to estimate the highest exposure level that could reasonably be expected to occur, but not necessarily the worst possible case (EPA, 1989a; 1991a). It is interpreted as reflecting the upper 90 to 95th percentile on exposure. In keeping with EPA (1989a; 1991a) guidance, variables chosen for a baseline RME scenario for ingestion rate, exposure frequency, and exposure duration are generally upper bounds. Other variables, such as body weight and exposed skin surface area, are generally central or average values. In the case of contact rates consisting of multiple components, e.g., dermal contact with soil or water, which consists of a dermal absorption factor (ABS) and soil-to-skin adherence factor (AF) for soil, and permeability coefficient (K_p) and exposure time (ET) for water, only one variable, ABS or K_p, needs to be an upper bound. The conservativeness built into the individual variables ensures that the entire estimate for contact rate is sufficiently conservative.

The averaging time for noncancer evaluation is computed as the product of the exposure duration (years) multiplied by 365 days per year. The resultant noncancer averaging time is used to estimate an average daily dose over the entire exposure period (EPA, 1989a). For cancer evaluation, the averaging time is computed as the product of 70 years, the assumed human

lifetime, times 365 days/year. This cancer-based averaging time is used to estimate an average daily dose prorated over a lifetime, regardless of the frequency or duration of exposure. The methodology used in deriving the averaging time for cancer risks assumes that the risk from short-term exposure to a high dose of a given carcinogen is equivalent to long-term exposure to a correspondingly lower dose, provided that the total lifetime doses are equivalent. This approach is generally consistent with the EPA (2005) policy of carcinogen evaluation, although it introduces considerable uncertainty into the BHHRA cancer risk estimates.

A fractional term (FI) is introduced into the chemical intake equations to account for scenarios in which exposure to a potentially contaminated medium associated with the site is less than total daily exposure to that medium. For example, if the site of interest is small or has unusual dimensions so that a groundskeeper would be unlikely to spend all (or nearly all) of his working time at the site, an FI value of less than 1 might be applied to the soil ingestion and dermal intake equations. An FI may also be split between two comparable media. For example, if a resident is exposed to both soil and sediment, FI values are introduced that apportion exposure between the two media such that the FI value for the two analogous media does not exceed a value of 1 (see Section 3.1.3.5).

Receptors and the associated exposure pathways are presented in the following subsections. Please note that some of the pathways considered for the receptors (e.g., surface water exposure; volatile organic compounds [VOC] in soil) could not be quantitatively evaluated because pertinent chemicals associated with these pathways were not identified as COPCs.

3.1.3.1 Current Groundskeeper

The groundskeeper scenario is designed to evaluate the upper bound for long-term site worker exposure to surface soil in the current site use scenario and total soil in the future site-use scenario. It is noted that no groundskeeper is currently working at the site, but current land use does not prohibit a site worker from performing groundskeeping activities at the site.

Exposure to surface soil is evaluated for a (potential) current groundskeeper. Total soil is typically evaluated under the future groundskeeper use scenario because hypothetical future construction may include considerable excavation of subsurface soil. This soil may be spread on the surface and regraded such that some of the soil currently in the subsurface (i.e., 1 to 10 feet bgs) will be spread as surface soil (0 to 1 foot bgs). Groundwater use is also evaluated for the groundskeeper in the future site-use scenario, as discussed in Section 3.1, which could theoretically be developed as a source of drinking water. It is assumed that any contact with surface water or sediment associated with AP1 by this receptor would be infrequent and

sporadic, because such contact would not be a part of the groundskeeper's regular duties or activities. Therefore, exposure to these media is not quantified.

Direct soil exposure pathways include incidental ingestion and dermal contact. Inhalation of dust raised by lawnmowers or other equipment is also evaluated because relatively high dust concentrations may be produced within the groundskeeper's breathing zone, with little opportunity for dilution by the large volume of ambient air.

Shaw's experience has been that surface soil that is contaminated with VOCs and that has been in place for extended periods is not a significant source of airborne VOCs, because infiltration and dissipation over time reduces residues at the surface (i.e., first few centimeters) from which volatilization would occur. However, as noted above, the data set for surface soil may include samples taken from up to 1 foot bgs, which would include the soil zone deeper than the top few centimeters, where dissipation has not reduced VOC concentrations. In other words, the surface soil data set might indicate the presence of VOCs, although volatilization to the air is unlikely to be significant. Therefore, a surface soil-to-air volatilization model is not used in addition to the activity-based dust emissions model to estimate airborne concentrations of VOCs. Instead, the airborne concentrations estimated by the dust emissions model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust emissions model treats the VOCs as if they were located at the surface. It is assumed that VOC emissions from subsurface soil (i.e., at depths greater than 1 foot bgs) would be attenuated by the overlying soil so that concentrations in ambient air would not be toxicologically significant.

The groundskeeper is assumed to be a 70-kilogram (kg) adult who works 8 hours per day, approximately 5 days per week year-round on site for a total of 250 days/year for 25 years (EPA, 2004a). The respiratory rate for the groundskeeper is assumed to be 20 cubic meters (m^3) per 8-hour workday or 2.5 cubic meters per hour (m^3/hr) (EPA, 1991a), and the soil incidental ingestion rate is assumed to be 100 milligrams per day (mg/day) (EPA, 2002). The groundskeeper is assumed to be exposed dermally to soil. An exposed skin surface area of 3,300 square centimeters (cm^2) and a soil AF of 0.2 milligrams per square centimeter (mg/cm^2) are assumed (EPA, 2004a).

3.1.3.2 Future Groundskeeper

A future groundskeeper would be exposed to soil via the same exposure pathways as the current groundskeeper described in Section 3.1.3.1. However, the future groundskeeper scenario assumes that construction has taken place and that some of the soil currently in the subsurface has been brought to the surface during earthmoving activities. Therefore, the future

groundskeeper is assumed to be exposed to a combination of surface and subsurface soil (total soil) rather than surface soil alone.

In addition, a hypothetical future groundskeeper is assumed to be exposed to groundwater, which could theoretically be developed as a source of drinking water in the future. His drinking water ingestion rate is assumed to be 1 liter per day (L/day) (EPA, 1991a). He may also experience dermal contact with groundwater used to clean equipment and to rinse dust or perspiration from his body. For this evaluation, it is assumed that the head, forearms, and hands, approximately 3,300 cm^2 of his body (EPA, 2004a), would be exposed intermittently for up to 1 hour/day. Because exposure is assumed to be intermittent rather than continuous, organic chemical uptake across the dermis would not reach steady state, which guides the selection of the EPA (2004a) model used to quantify this pathway (see Section 3.3).

3.1.3.3 Indoor Worker

This receptor scenario was used to evaluate exposure to indoor airborne VOCs entrapped in a building. VOCs released from subsurface soil may enter a building through joints or cracks in the foundation or slab. The indoor worker is also potentially exposed to surface soil via incidental ingestion. Exposure to COPCs in surface soil via dermal contact and inhalation of airborne dust and VOCs from surface soil, although plausible, are expected to be less significant than incidental ingestion, because this receptor spends his work time indoors. Therefore, dermal contact and inhalation of dust and airborne VOCs from surface soil are not quantified separately from ingestion exposure (EPA, 2002). Under a future use scenario for this receptor, construction of a building would be necessary. This would require excavation and regrading of soil. Normally, when construction is involved, such as for the future groundskeeper or resident, total soil rather than surface soil would be evaluated for ingestion exposure. However, the chief purpose for this receptor is to evaluate exposure via vapor intrusion of contaminants from subsurface soil into indoor air. Thus, the evaluation of direct contact with subsurface soil as a component of total soil would equate to “double counting” of COPCs in subsurface soil. Also, the groundskeeper reflects a worst-case exposure for a long-term worker with respect to direct contact with both surface soil and total soil. Therefore, direct contact with surface soil for the indoor worker is included to reflect a more complete exposure scenario, but direct contact with subsurface soil is most effectively addressed from an RME perspective by the groundskeeper.

The indoor worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week year-round on the site for a total of 250 days/year for 25 years (EPA, 2002). His incidental soil ingestion rate is assumed to be 50 mg/day (EPA, 2002), and his inhalation rate is assumed to be 20 m^3/8-hour workday (EPA, 1991a).

A future indoor worker is assumed to be exposed to groundwater, which could theoretically be developed as a source of drinking water (see Section 3.1). His drinking water ingestion rate is assumed to be 1 L/day (EPA, 1991a). Some indoor worker positions may require relatively frequent dermal contact with groundwater as well, e.g., a food preparer/cafeteria worker who would wash his hands, produce, equipment, etc. For this evaluation, it is assumed that the head, forearms, and hands, approximately 3,300 cm^2 of his body (EPA, 2004a), would be exposed intermittently for up to 1 hour per day. Because exposure is assumed to be intermittent rather than continuous, organic chemical uptake across the dermis would not reach steady state, which guides the selection of the EPA (2004a) model used to quantify this pathway (see Section 3.3.4).

3.1.3.4 Construction Worker

The construction worker scenario is used to evaluate short-term exposure to surface and subsurface soil (total soil) in either the current or future land-use scenario. Construction projects are expected to be infrequent. It is assumed that the construction worker participates in only one construction project on the site. Note that no construction projects are anticipated for AP1, but AP1 is currently under NASA control and a construction project may be possible under current land use. Relevant exposure pathways include incidental ingestion and dermal contact, inhalation of dust raised by operating construction equipment, and inhalation of airborne VOCs released from subsurface soil during excavation and grading. Exposure to groundwater by the construction worker is also possible; however, if on-site groundwater were developed as a tap water source, other potential future groundwater receptors such as the groundskeeper would have longer and/or more frequent groundwater exposure. Therefore, groundwater exposure is not evaluated for the construction worker.

The construction worker may also be exposed to surface water and sediment associated with AP1 during projects such as installation of underground utilities or rerouting stream flow. Dermal contact is the most significant pathway for exposure to surface water. Incidental ingestion of surface water is also possible but is not expected to be nearly as significant as dermal contact. Inhalation of VOCs from surface water is also possible, but the large volume of outdoor air and natural air currents are expected to dilute airborne concentrations, so that this pathway is expected to be less significant than dermal contact, which is quantified. For these reasons, incidental ingestion and inhalation of VOCs from surface water are not quantified separately from dermal contact. Dermal contact and incidental ingestion may be important pathways for exposure to sediment, and both are evaluated.

The construction worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week. This represents an annual exposure frequency rate of about 250 days per year, which

is the same as described for the groundskeeper (Section 3.1.3.1) and indoor worker (Section 3.1.3.3). Construction projects involving soil exposure are assumed to last 6 months. The respiratory rate for the construction worker is assumed to be 20 m^3/8-hour workday (2.5 m^3/hr) (EPA, 1991a). A soil ingestion rate of 330 mg/day is assumed for the construction worker (EPA, 2002). A dermal soil AF for the construction worker of 0.3 mg/cm^2 and an exposed body surface area of 3,300 cm^2 are assumed, which represent the head, hands, and forearms (EPA, 2002; 2004a).

The construction worker may be exposed to surface water and sediment during the 6-month construction period. The construction worker dermal exposure parameters for sediment are assumed to be exactly the same as those for soil. Dermal exposure to surface water is assumed to occur for up to 4 hours per day, or one-half the normal work day. It is assumed the exposure to surface water is intermittent during this period. An exposed body surface area of 3,300 cm^2, the same as for sediment and soil, is assumed for exposure of the construction worker to surface water. It is expected that the construction worker would wear appropriate footgear and leg protection to minimize surface water and sediment exposure to the legs.

The construction worker scenario described above provides for several different kinds of construction projects, such as upland excavation and building projects (exposure primarily to soil), as well as stream rerouting (exposure primarily to surface water and sediment). It is unlikely, however, that a single construction worker would participate in all these activities during a given project. Therefore, the evaluation described above is probably overly conservative and may represent some double counting. For example, it is unlikely that the construction worker would be simultaneously ingesting soil, sediment, and surface water. Similarly, the air in his breathing zone is not likely to contain the reasonable maximum concentrations of COPCs estimated for soil while he is exposed to surface water. The potential for double counting is not expected to contribute significantly to total risk estimates summed across chemicals, pathways, and media. Should construction worker risk estimates exceed acceptable limits, risk and hazard estimates may be performed using refined exposure assumptions based on the physical characteristics of the site. For example, an upland excavation and building project may be assumed for one or more areas of the site, and a stream rerouting project may be assumed for another. Effectively, the risks and hazards associated with surface water/sediment exposure and soil exposure could be separated. This approach would more precisely reflect plausible exposure scenarios, reduce the likelihood of double counting, and more accurately identify risk-driving media and chemicals. These refined estimates would be presented in the uncertainty analysis.

3.1.3.5 On-Site Resident

The on-site residential scenario is used to evaluate the upper bound for long-term exposure to site soil, surface water, sediment, and groundwater under the future land-use scenario. Residential land use is plausible because property surrounding the PBOW facility includes rural residential use. This type of land use is also consistent with assumed future land use of other PBOW sites such as TNTA and TNTC (IT, 2001a).

The on-site residential scenario is evaluated assuming a 30-year residential exposure scenario, considering exposure to a resident as a young child (6-year duration, ages 1 through 6 years) through the adult portion of life spent at this residence (24-year duration) (EPA, 1991a). Noncancer hazard estimates are derived separately for the child and adult life stages. Cancer risk is estimated as the sum of the risks calculated for the adult (24 years) and the child (6 years) (EPA, 2002; 2010e).

The resident is assumed to be exposed directly to total soil, because residential development would involve excavation and regrading, which would mix surface and subsurface soil. Relevant pathways for total soil exposure include incidental ingestion, dermal contact, and inhalation of dust and VOCs. Evaluation of VOCs from total soil is addressed during evaluation of airborne dust, as described for the groundskeeper. For evaluating inhalation of airborne dust, it is assumed that 80 percent of the soil surface is covered with pavement or vegetation. Inhalation of VOCs released from subsurface soil entrapped in indoor air is also evaluated. The resident is also assumed to be exposed to VOCs that have been released from subsurface soil through cracks in the building foundation to indoor air. It is noted that because some of the subsurface soil is expected to be brought to the surface in the future, using only subsurface soil data will conservatively result in some double counting of exposure to any VOC COPCs that may be present in the subsurface soil. This may be addressed in the uncertainty analysis should the subsurface soil-to-indoor air pathway significantly affects risk and hazard estimates. This pathway did not contribute significantly to risk at AP1, as no VOCs were identified as COPCs in subsurface soil.

It is assumed that, under future residential land use, the overburden and limestone bedrock water units will be developed as sources of potable water (see Section 3.1). The resident is assumed to use groundwater underlying the site as the sole source of household tap water. Exposure to COPCs in groundwater would occur via ingestion, dermal contact during bathing/washing, and inhalation of VOCs released to the air during household use of tap water associated with multiple household uses.

The resident could have access to the unnamed tributary to Plum Brook in the vicinity of AP1 and could be exposed to contaminants in surface water and sediment associated with AP1. Plausible exposure pathways include dermal contact with surface water and incidental ingestion and dermal contact with sediment. Incidental ingestion of surface water in a wading scenario is considered less significant than dermal contact and is not quantified separately from dermal contact. Inhalation of VOC emissions from surface water is also possible, but the large volume of outdoor air and natural air currents are expected to dilute airborne concentrations, so that this pathway is expected to be less significant than dermal contact, which is quantified. For these reasons, the inhalation of VOC emissions from surface water is not quantified separately from dermal contact.

The adult resident is assumed to be a 70-kg person with an incidental soil ingestion rate of 100 mg/day and an inhalation rate of 20 cubic meters per day (m^3/day) or 0.83 m^3/hr (EPA, 1991a). A body surface area of 5,700 cm^2, representing the hands, forearms, head, and lower legs, is assumed to be available for dermal exposure to soil (EPA, 2004a). A soil AF of 0.07 mg/cm^2 is used as the default RME value for the adult resident (EPA, 2004a). The adult resident is assumed to be exposed for 350 days/year for 24 years (EPA, 1991a; 2002).

The child resident is assumed to be a 1- through 6-year-old child with an average body weight of 15 kg, a soil ingestion rate of 200 mg/day, and an average inhalation rate of 10 m^3/day or 0.417 m^3/hr (EPA, 2004d). An average body surface area of 2,800 cm^2 throughout the 6-year childhood exposure period, representing the head, hands, forearms, lower legs, and feet, is assumed for dermal contact with soil (EPA, 2004a). A soil AF of 0.2 mg/cm^2 is used as the default RME value for the child resident (EPA, 2004a). The child resident is assumed to be exposed for 350 days/year for 6 years (EPA, 1991a; 2002).

It is assumed that the resident would visit the unnamed tributary to Plum Brook in the vicinity of AP1 surface water for 8 hours/day, 2 days/week during the warmer half of the year. This resident is assumed to wade for 3 hours/day on 52 days of the year. Mechanisms of exposure to soil and sediment are likely to be similar. Therefore, the incidental soil ingestion rate of 100 mg/day, the surface area of 5,700 cm^2, and the AF of 0.07 mg/cm^2 are also applied to sediment exposure in the adult. Similarly, the resident child soil ingestion rate of 200 mg/day, skin surface area of 2,800 cm^2, and soil AF of 0.2 mg/cm^2 are applied to sediment exposure for this receptor. The unnamed tributary to Plum Brook in the vicinity of AP1 generally contains less than 2 feet of water. The shallowness of the surface water would limit the surface area of the body that would typically be exposed. It is assumed that an adult body surface area of 7,000 cm^2 is available for exposure to surface water. This represents the same body parts to which soil and sediment would

be exposed (i.e., hands, forearms, head, and lower legs) plus the feet (EPA, 1997a; 2004a). The body surface area of 2,800 cm^2, representing the hands, forearms, head, lower legs, and feet, used for soil and sediment exposure in the young child are also used for surface water exposure for this receptor.

EPA (1989a) permits the development of an FI to reflect the proportion of total daily exposure that a receptor obtains from potentially contaminated medium (refer to Section 3.1.3). For this receptor, the FI is used to apportion the resident's time of exposure between site soil and sediment. It is assumed that the resident spends 16 hours/day awake and potentially exposed to soil or sediment. As previously noted, 350 days/year are available for contact with soil; 52 of those days are also available for contact with sediment. It is assumed that contact with soil and sediment does not occur simultaneously; i.e., on those days when the resident spends time at the streams, 8 hours would be spent in contact with soil and 8 hours would be spent in contact with sediment. Therefore, the fraction of exposure to soil is 16 hours/16 hours = 1 on the 298 days without time spent at the streams, and the fraction of exposure to soil is estimated as 8 hours/16 hours = 0.5 on the 52 days with some time spent at the streams. A weighted fraction of 0.93 (rounded to 0.9) is estimated for exposure to soil over the entire 350 days/year exposure frequency. A weighted fraction of 0.07 (rounded to 0.1) is estimated for exposure to sediment over the entire 350 days/year exposure frequency.

An adolescent resident may be the most likely individual to have regular exposure to sediment and surface water associated with AP1. It is not expected that adults would regularly visit the AP1 surface water areas, as these areas do not support game fish and would seemingly not provide any attraction. It is unlikely that a young child (i.e., ages 1 through 6) would frequent these areas for substantial portions of time, because such young children (especially at the lower end of this age range) would require continued adult supervision. However, as described above, it is conservatively assumed that the resident will be regularly exposed to surface water and sediment for 30 years, 6 years assumed as a young child and 24 years assumed as an adult. For cancer effects, the 30-year exposure to surface water and sediment represented by both the young child and adult are combined. This approach is more conservative than evaluating an adolescent and is also consistent with BHHRAs performed for PBOW sites in the past.

With respect to groundwater exposure, it is assumed that an adult resident ingests 2 L/day of tap water (EPA, 1991a) and that the young child drinks 1 L/day (EPA, 2010d). The total body surface areas of the adult and of the young child resident are assumed to be exposed to tap water while bathing/showering. The total surface area for an adult is assumed to be 20,000 cm^2 and the total surface area for the young child is assumed to be 6,600 cm^2 (EPA, 1997a). Both the child

and adult resident are assumed to be dermally exposed to COPCs in groundwater while bathing/showering. The child is assumed to bathe for 20 minutes per day (0.33 hour/day) (EPA, 1997a), and the adult is assumed to shower for 12 minutes per day (0.2 hour/day) (EPA, 1997a). Inhalation rates of 0.833 m^3/hr for the adult (EPA, 1991a) and 0.416 m^3/hr for the child (EPA, 2004d) are used. Because EPA (1997a) lists a 90th percentile for time spent in a residence as over 23 hours per day, it is conservatively assumed that the resident spends 24 hours per day in the house.

3.1.3.6 Hunter

This scenario is created to evaluate the potential for contaminants in soil to affect food chain pathways. AP1 provides habitat for deer and other wildlife. Even though hunting is not currently permitted at AP1, deer hunting is permitted in other areas within PBOW; therefore, future use of AP1 for hunting is evaluated in this BHHRA.

Many kinds of game animals may be hunted and consumed (e.g., squirrel, pheasant and other upland birds, turkey, deer); however, the deer is the species most likely to contribute meaningfully to the diet. Therefore, this evaluation is limited to a deer hunter. Potential exposure pathways include incidental surface soil ingestion, dermal contact with surface soil, and ingestion of venison from deer that browse plants growing on contaminated surface soil, all of which are evaluated quantitatively. Inhalation of airborne dust from wind currents is a potentially complete exposure pathway; however, vegetation reduces dust emissions to insignificant levels (EPA, 1996), and it is assumed that the deer hunter would spend virtually all of his time on vegetated rather than bare soil. Therefore, it is assumed that inhalation exposure would contribute much less than incidental ingestion, and the inhalation exposure pathway is not quantified separately from ingestion.

Inhalation exposure to airborne VOCs from subsurface soil and surface water is not evaluated for the reasons previously explained for other receptors. Also, ingestion and dermal exposure to surface water and sediment are expected to be negligible for this receptor, as contact with these media would generally be avoided during hunting activities.

The deer hunter is assumed to be a 70-kg adult who harvests deer and consumes venison over a 30-year period. It is assumed that he spends 14 days per year hunting on PBOW. His incidental soil ingestion rate is assumed to be 100 mg/day (EPA, 1991a). Hunting at PBOW occurs in the fall and winter. Given the temperate climate of northern Ohio during hunting season, a hunter would dress appropriately, with typically only the hands and head exposed, at most. The default industrial RME exposed skin surface area of 3,300 cm^2, which represents the hands, forearms,

and head (EPA, 2004a), is conservatively assumed for the hunter. The default industrial RME soil AF of 0.2 mg/cm^2 (EPA, 2004a) is also assumed.

Data regarding the rate of venison ingestion were not located; therefore, a hypothetical scenario is adapted from the assumptions applied to a similar site in West Virginia (IT, 2000) and subsequently applied to TNTA and TNTC (IT, 2001a). A highly conservative but plausible scenario consists of a hunter who kills one deer from the AP1 property each year. It is assumed that the hunter eats 10 pounds (4.5 kg) of venison per year (Sharp, 1995). This consumption rate corresponds to 0.013 kilograms per day (kg/day) (0.186 grams per kilogram of body weight per day [g/kg-day]) of venison for each of the 350 days per year (EPA, 1991a) that the hunter spends at his residence.

3.1.3.7 Hunter's Child

It is likely that a successful hunter, described in Section 3.1.3.6, would share his venison with the rest of the family, which may include small children. Small children, however, would be unlikely to accompany the hunter afield. Therefore, the direct exposure pathways evaluated for the hunter (i.e., incidental ingestion and dermal contact with soil) are not evaluated for the small child.

Data regarding the rate of venison ingestion by small children were not located. However, if it is assumed that venison may replace beef in the diet, the differences in beef consumption between adults and children can be used to estimate a venison ingestion rate for children. EPA (1997a) provides per capita beef intake data for <1- to 5-year-old children ranging from 0.941 to 1.46 g/kg-day (time-weighted average of 1.296 g/kg-day). EPA (1997a) provides per capita beef intake data for 12- to 70-plus-year-old adults ranging from 0.568 to 0.83 g/kg-day (time-weighted average of 0.727 g/kg-day). From these data, it can be estimated that the rate of beef consumption for small children, expressed on a body weight basis, is approximately 1.8 times that of an adult. Therefore, a venison ingestion rate of 0.335 g/kg-day is estimated for a young child from the venison ingestion rate of 0.186 g/kg-day for the adult. Assuming that the child is 1 through 6 years old with an average body weight of 15 kg (EPA, 1991a; 2002), the child's venison ingestion rate may be expressed as 0.005 kg/day.

3.1.3.8 Other Receptors Not Considered

Another plausible receptor group is delivery personnel. These receptors, however, would be less intensively exposed to soil than the groundskeeper; therefore, their exposures are not evaluated. AP1 could become part of the area used for National Guard training activities. National Guard trainees, however, may be less exposed to any of the potentially contaminated media than the receptors identified above. Because they would likely not represent an upper bound for

nonresidential exposure, these receptors are not evaluated. The unnamed tributary to Plum Brook is too small to support game fish. Therefore, fish ingestion as an indirect pathway for exposure to surface water and sediment is not evaluated. Also, as discussed in Section 3.1, off-site use of groundwater is not evaluated because nearby residents use municipal water (from surface water sources) as a potable source, and potential on-site users would be exposed to higher concentrations of contaminants in groundwater.

3.2 Quantification of Exposure-Point Concentrations

The EPC is an estimate of the concentration of a COPC in a given medium to which a receptor may be exposed over the duration of the exposure. An EPC may be based on chemical concentrations in media that have been directly measured using laboratory analysis, or it may be derived based on environmental medium-to-medium transport modeling. The EPCs of COPCs in soil, groundwater, surface water, and sediment are derived based on measured analytical data. Note that the EPC for dermal exposure to VOCs in groundwater is based on one-half the EPC concentration derived from the measured concentrations in groundwater (Sections 3.2.1 and 3.2.2.3). This value is used because it is assumed that 50 percent of the groundwater VOC concentration is volatilized during normal household use (Section 3.2.2.2). Concentrations of COPCs in air and venison are not measured (and in some cases cannot reasonably be measured) but are based on models that use the EPCs of COPCs in the appropriate directly measured media (i.e., soil and groundwater) as input values.

Section 3.2.1 describes the approaches used to derive EPCs for direct exposure to soil, groundwater, surface water, and sediment based on analytical measurements from samples of these media. Models to derive EPCs for the air are described in Sections 3.2.2.1 and 3.2.2.2, and the model used to derive venison EPCs is described in Section 3.2.2.4.

3.2.1 Soil, Groundwater, Surface Water, and Sediment Concentrations

Exposure to an environmental medium is generally assumed to be random, and the EPC should be the arithmetic average encountered over the duration of exposure (EPA, 1989a). Therefore, the population mean concentration, if known, would be the ideal value selected as the EPC. The sample mean is an obvious estimate of the population mean. However, uncertainties exist as to how well the sample mean represents the population mean. Therefore, EPA (1989a) has recommended the inclusion of a UCL for RME evaluation as a conservative estimate of the true mean exposure concentration.

The EPA (2010a,b,c) ProUCL (Version 4.00.05) software was used to estimate UCLs for the data sets of all environmental media represented by at least five samples. If the data set consists

of fewer than five data points, the MDC was selected as the EPC. Analytical data from field duplicates are averaged with originals to yield one result for use in the statistical manipulations (see Section 2.5). One-half the reporting limit is used as the ProUCL input concentration for nondetects. Nondetect sample results with aberrantly high detection limits due to matrix interferences or other sample-specific causes, are included in the initial ProUCL calculations. This is a conservative approach, as EPA (1989a) recommends that nondetect results with aberrantly high detection limits be removed from the data set so that calculation of the UCL is not unduly skewed by a nondetect. Because the latest version of ProUCL (EPA, 2010a) includes mathematical manipulations under the default "with NDs" mode that are more robust than previous versions, single elevated detection limits are less likely to skew the UCL estimates than in the past. If it is observed during the risk characterization that an elevated nondetect value skews a UCL estimate such that this value substantially affects the result of the risk estimate, the ProUCL model is rerun without the elevated nondetect value and the risks are recalculated. If this recalculation is performed on a data set, data eliminated for the recalculation are identified in the risk characterization and discussed in the uncertainty analysis. The re-evaluation of elevated nondetects was not performed in the AP1 BHHRA.

ProUCL generates a variety of UCL estimates for each data set. The ProUCL output for each COPC is included in Appendix B. Generally, the results of one or two (sometimes more) of the UCL estimates are recommended. This recommendation is based on a variety of factors, including the distribution (i.e., normal, lognormal, gamma, or not discernable) that provides the best fit, number of nondetects, size of the data set, and skewness. If the recommended value(s) under the default mode equals or exceeds the MDC, ProUCL is re-run using the full data set mode, under the assumption that the COPC is present in nondetects at one-half the reporting limit. Occasionally, ProUCL recommends the 97.5 or 99 percent upper confidence limit on the arithmetic mean estimated by the Chebyshev method. In these cases, the UCL estimated by the Chebyshev method (95th percent) is selected as the EPC because this is more consistent with the intent of the RME paradigm as defined by EPA (1989a; 1991a).

The UCL generated by the ProUCL protocol described in the preceding paragraphs or the MDC, whichever is smaller, is selected as the EPC and is understood to represent a conservative estimate of average for use in the risk assessment or in various transport models used to estimate EPCs. Note that EPA (1989a) guidance states that an estimate of average rather than the MDC should be used to represent the EPC under chronic exposure and that use of the maximum is typically not reasonable. Therefore, data sets which use the MDC as the EPC are generally biased high. Unusually high detected values are included in the calculation of the UCL

concentration. Inclusion of these high values increases the statistical variability and the overall conservativeness of the risk estimate.

ProUCL is a software tool that provides estimates of the UCL using a variety of mathematical approaches. As mentioned, its output includes one or more recommendations. Depending on the data set, some of the estimates generated by the various calculation methods included in ProUCL may vary by an order of magnitude. ProUCL and the decision tree on which its recommendations are based have been developed using multitudes of simulated data sets with a variety of distributions and other characteristics. There are uncertainties as to how well this decision tree derives a recommended UCL for a given data set. This uncertainty tends to increase with variability and skewness and where a large number of the samples are nondetects. For example, with respect to distribution testing, ProUCL bases the determination of distribution type only on the detected samples. The true concentrations of the nondetected values are unknown, and this lack of information can affect the distribution determination and consequently affect the ProUCL recommendation. The general uncertainties associated with the EPC values and the use of ProUCL are discussed in the uncertainty analysis (Chapter 6.0). Specific uncertainties associated with the EPC values of specific data sets may be discussed in the uncertainty analysis as appropriate.

3.2.2 Exposure-Point Concentrations in Air

The models shown in the following subsections for estimating COPC concentrations in air include only those relevant and used specifically for AP1 COPCs and media.

3.2.2.1 COPC Concentrations from Dust

Inhalation exposure to particulate (dust) emissions from soils for the groundskeeper and construction worker evaluations arises from activities that raise dust. Therefore, the most appropriate approach for estimating chemical concentrations in ambient air is the use an activity-based dust loading equation (U.S. Department of Energy [DOE], 1989):

Eq. 3.1

$$C_a = (D)(C_s)(CF_1)$$

where:

C_a	=	contaminant concentration in air (milligrams per cubic meter [mg/m^3], calculated)
D	=	dust loading factor (grams [g] of soil/m^3 of air)
C_s	=	contaminant concentration in soil (mg/kg)
CF_1	=	conversion factor (1E-3 kg per g).

Plausible values for D include 2E-4 grams per cubic meter (g/m^3) for agricultural activity (DOE, 1989), 6E-4 g/m^3 for construction work (DOE, 1983), and 1E-4 g/m^3 for other activity (National Council on Radiation Protection and Measurements, 1984). The value for D of 1E-4 g/m^3 for other activity is used for the groundskeeper. It is assumed that construction activities requiring intensive contact with soil, for which D = 6E-4 g/m^3 is appropriate, may last for one-half of a construction period. The remaining one-half of the time is more realistically characterized by D = 1E-4 g/m^3. Therefore, a time-weighted average dust loading factor for construction work of 3.5E-4 g/m^3 is estimated for the construction worker.

Airborne concentrations of VOCs estimated by the dust loading model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust loading model treats the VOCs as if they were located at the ground surface.

The resident is more likely to be exposed to dust arising from wind erosion than from dust-raising activities on the site. EPA (1996) derived a model for estimating a dust particulate emission factor (PEF) based on an "unlimited reservoir" model and the assumption that the source area is square:

Eq. 3.2

$$PEF = Q/C \times \frac{3600}{0.036 \times (1 - V) \times (U_m / U_t)^3 \times F(x)}$$

where:

PEF	=	particulate emission factor (cubic meters per kilogram [m^3/kg], calculated)
Q/C	=	inverse of the mean concentration at center of square source (55.99 grams per square meter-second per kg/m^3, site-specific value from Table 3 in EPA [1996] [Zone 7, Cleveland, 5-acre site])
3600	=	seconds/hour
V	=	fraction of surface covered with vegetation (0.8, unitless, assumed)
U_m	=	mean annual wind speed (default, 4.60 meters per second [m/second] equals mean annual wind speed of 10.3 miles per hour [see Section 3.1.1])
U_t	=	equivalent threshold value of wind speed at 7 meters (default, 11.32 m/second)
F(x)	=	function dependent on U_m/U_t (default, 0.194).

The concentration of a COPC in air is calculated as follows:

Eq. 3.3

$$C_a = \frac{C_s}{PEF}$$

where:

C_a = contaminant concentration in air (mg/m^3, calculated)
C_s = contaminant concentration in soil (mg/kg)
PEF = particulate emission factor (m^3/kg).

Airborne concentrations of VOCs estimated by the wind erosion model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the wind erosion model treats the VOCs as if they were located at the ground surface.

3.2.2.2 Concentrations in Household Air from Groundwater Use

The inhalation of VOCs released from groundwater, which is assumed to be used as tap water, is evaluated for the on-site residential scenario. Chemicals that have a Henry's Law value exceeding 1E-5 atmospheres/m^3-mole and a molecular weight less than 200 g/mole are considered to be VOCs and are subject to evaluation via this pathway; Henry's Law values and molecular weights are presented in Table 3-3. Other groundwater contaminants are considered on a case-by-case basis for their potential contribution to risk via the inhalation pathway based on the degree of departure from the Henry's Law and molecular weight criteria, groundwater concentration, and toxicity.

The simple whole-house tap water-to-air model described in Part B of the EPA (1991b) Human Health Evaluation Manual (HHEM) was used to evaluate the tap water-to-air pathway. This model was selected based on correspondence between OEPA (2004) and USACE. Part B of the HHEM recommends a volatilization constant of 0.0005 for the total concentrations of all VOCs detected in groundwater; the conversion is characterized by the following equation:

Eq. 3.4

$$C_a = C_{gw} \times K_{wa} \times 1{,}000 \, {}^{L}\!/_{m^3}$$

where:

C_a = modeled concentration in air (mg/m^3)
C_{gw} = groundwater EPC (mg/L)
K_{wa} = tap water-to-air volatilization constant (0.0005 [unitless]: [EPA, 1991b])

Implicit in the HHEM Part B application of this model are the following assumptions: 1) A family of four uses the groundwater as the sole source of household tap water, 2) the volume of the house is 150 m^3, 3) the daily groundwater use is 720 L/day, 4) 50 percent of VOCs in tap water volatilize to household air, and 5) the air exchange rate of the house is 0.25 volumes per hour (EPA, 1991b).

3.2.2.3 Concentrations of VOCs in Groundwater: Resident Dermal Uptake

Volatilization of VOCs from household water reduces the remaining concentration available for dermal contact. As mentioned in Section 3.2.2.2, the HHEM Part B whole-house tap water-to-air model assumes that 50 percent of the VOC concentrations are released to household air. Thus, the concentrations of VOCs remaining in the water after volatilization occurs are calculated by difference as follows:

Eq. 3.5

$$C_d = C_{gw} \times (1 - F_v)$$

where:

C_d = concentration of VOC in household water available for dermal exposure (mg/L, calculated)
C_{gw} = concentration of VOC in groundwater (mg/L)
F_v = fraction of VOCs volatilized to air, (0.5 unitless).

Only the concentration remaining in tap water after volatilization (C_d), as applicable, is assumed to be available for contact with the skin during bathing/showering.

3.2.2.4 Exposure-Point Concentrations of COPCs in Venison

The hunter is assumed to harvest and consume game and share it with family members, including small children. The game is assumed to be venison, because the white-tailed deer is the species hunted most widely and most likely to provide a regular contribution to the diet. Data do not exist to reliably estimate contaminant concentrations in venison, but the following simplifying assumptions permit estimates sufficient for a BHHRA.

- Deer are small ruminants and, as such, are not unlike cattle; thus, it is reasonable to assume they may have similar physiological processes that could yield similar biotransfer factors. Unlike beef, however, deer meat does not undergo marbling with fat, and deer fat is quite unpalatable and is likely to be trimmed rather than consumed. Therefore, the biotransfer factors for edible venison are derived by adjusting biotransfer factors for beef to account for differences in the fat content of table-ready beef (cooked choice retail cuts trimmed to 0 inches of fat: average 14.4 percent fat) and venison (cooked boneless muscle meats: average 2.9 percent fat) (Nutrient Database, 1997).

- Deer are expected to browse a much larger area than that encompassed in AP1; therefore, the fraction of total browse consumed from AP1 is expected to be relatively small.

- Indirect food chain pathways may be significant for some metals and for those semivolatile organic compounds that persist in the environment and have the

tendency to bioaccumulate. VOCs are generally mobile in the environment and labile in biological systems and do not tend to bioaccumulate.

To reflect the assumptions previously noted, venison biotransfer factors are estimated by multiplying beef biotransfer factors by 2.9/14.4 (or 0.20), and by a fraction, FI_r. This fraction reflects the areal portion of the site compared to a deer's home range area. These assumptions are captured in the following equation:

Eq. 3.6

$$B_v = 0.20(B_b)(FI_r)$$

where:

B_v	=	biotransfer factor for venison (unitless, calculated)
0.20	=	factor to reflect differences in fat content between beef and venison (0.20, unitless, see above)
FI_r	=	areal portion of site compared to a deer's home range (0.03, unitless, see below)
B_b	=	biotransfer factor for beef.

Values for B_b for metals are provided in the toxicity profiles (Appendix C). Toxicity profiles are prepared for each of the COPCs. The toxicity profiles briefly describe the uses of the chemical, its physical properties, behavior in environmental media, biotransfer capability, and toxicity values.

The AP1 area is relatively small in comparison to the home range of a white-tailed deer. The total acreage of the AP1 study area is approximately 2 acres. The home range of the white-tailed deer is between 150 and 1,280 acres (Sample and Suter, 1994). Even if the low end of this range (150 acres) is assumed for deer in northern Ohio, the area represented by AP1 is approximately 1 percent of this land area. Although the use of FI_r equal to 0.01 or lower is justified, an FI_r value of 0.03 is used in the BHHRA to be consistent with other small sites evaluated at PBOW.

Deer are assumed to be exposed to contaminants by ingesting browse growing on contaminated soil. It is estimated that deer consume approximately 1.74 kg of browse per day (Sample, et al., 1996), which is approximately 50 percent dry matter (DM), or 0.87 kg browse DM per day (Mautz, et al., 1976). The contaminant concentration in browse is estimated from the following equation, which was originally developed for estimating the contaminant concentration in forage to which cattle may be exposed (EPA, 1994):

Eq. 3.7

$$C_p = (CF)(C_s)(B_p)$$

where:

C_p	=	concentration of contaminant in (plant) forage DM (mg/kg, calculated)
CF	=	conversion factor to adjust for soil containing 20 percent moisture (1.25, unitless).
C_s	=	concentration of contaminant in soil (mg/kg)
B_p	=	soil-to-forage biotransfer factor (mg of chemical per kg of dry plant/mg of chemical per kg of dry soil).

Values for B_p are taken from the toxicity profiles in Appendix C. B_p values for the vegetative parts of plants, rather than the reproductive parts of plants, are selected, as possible, because deer browse year-round, and the vegetative parts are more available for the greater part of the year.

The concentration of a COPC in venison can be estimated from the following equation (adapted from EPA [1994]):

Eq. 3.8

$$C_v = (Q_p)(C_p)(B_v)$$

where:

C_v	=	contaminant concentration in venison (mg/kg, calculated)
Q_p	=	browse ingestion rate (0.87 kg DM/day)
C_p	=	contaminant concentration in browse DM (mg/kg)
B_v	=	biotransfer factor for venison (days/kg).

3.3 Quantification of Chemical Intake

This section describes the models used to quantify doses or intakes of the COPCs by the exposure pathways identified above. Models were taken or modified from EPA (1989a) unless otherwise indicated.

3.3.1 Inhalation of COPCs in Air

The inhaled dose of a COPC in air (for the groundskeeper, construction worker, on-site resident: inhalation of dust and VOCs in ambient air from surface or total soil; for the construction worker: inhalation of VOCs in ambient air from subsurface soil; for the indoor worker and on-site resident: inhalation of VOCs in indoor air from subsurface soil) is estimated as follows:

Eq. 3.9

$$I_a = \frac{(C_a)(FI_a)(IR_a)(EF)(ED)}{(BW)(AT)}$$

where:

I_a = inhaled dose of COPC (milligrams per kilograms per day [mg/kg-day], calculated)
C_a = concentration of COPC in air (mg/m^3)
FI_a = fraction of exposure attributed to site media (unitless)
IR_a = inhalation rate (m^3/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days).

3.3.2 Incidental Ingestion of COPCs in Soil or Sediment

The ingested dose of a COPC in soil (groundskeeper, construction worker, resident, indoor worker, hunter) or sediment (construction worker, resident) is estimated from the following equation:

Eq. 3.10

$$I = \frac{(C)(FI)(IR)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

I = I_s for soil, I_{sd} for sediment, = ingested dose of COPC (mg/kg-day, calculated)
C = C_s for soil; C_{sd} for sediment; = concentration of COPC (mg/kg)
FI = FI_s for soil; FI_{sd} for sediment; = fraction of exposure attributed to site medium (unitless)
IR = IR_s for soil; IR_{sd} for sediment; = ingestion rate of medium (mg/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
CF = conversion factor (1E-6 kg/mg)
BW = body weight (kg)
AT = averaging time (days).

3.3.3 Incidental Ingestion of COPCs in Water

The ingested dose of a COPC in groundwater (future groundskeeper, resident) is estimated from the following equation:

$$I_w = \frac{(C_w)(IR_w)(FI_w)(EF_w)(ED_w)}{(BW)(AT)} \qquad \text{Eq. 3.11}$$

where:

I_w = ingested dose of COPC in water (mg/kg-day, calculated)
C_w = concentration of COPC in water (mg/L)

IR_w = water ingestion rate (L/day)
FI_w = fraction of exposure attributed to site water (unitless)
EF_w = fraction of exposure attributed to site water exposure frequency (days/year)
ED_w = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days).

3.3.4 Dermal Contact with COPCs in Soil, Sediment, or Water

Unlike the methodologies for estimating inhaled or ingested doses of a COPC, which quantify the dose presented to the barrier membrane (the pulmonary or gastrointestinal mucosa, respectively), dermal dose is estimated as the dose that crosses the skin and is systemically absorbed. For this reason, dermal toxicity values are also based on absorbed dose. The absorbed dose of a COPC is estimated from the following equation (EPA, 2004a):

Eq. 3.12

$$DAD = \frac{(DA)(SA)(EF)(ED)}{(BW)(AT)}$$

where:

DAD = average dermally absorbed dose of COPC (mg/kg-day, calculated)
DA = dose absorbed per unit body surface area per day (milligrams per square centimeter per day [mg/cm^2-day])
SA = SA_s for soil, SA_{sd} for sediment, S_{gw} for groundwater, SA_{sw} for surface water, = surface area of the skin exposed (cm^2)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days).

Dose absorbed per unit body surface area per day (DA) is calculated differently for dermal uptake from soil/sediment and from water. Dermal uptake of constituents from soil (groundskeeper, construction worker, on-site resident, hunter) or sediment (construction worker, on-site resident) assumes that absorption is a function of the fraction of a dermally applied dose that is absorbed. DA is calculated from the following equation (EPA, 2004a):

Eq. 3.13

$$DA = (C_s)(FI_s)(CF)(AF)(ABS)$$

where:

DA = dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C = C_s for soil, C_{sd} for sediment, = concentration of COPC in medium (mg/kg)

FI = FI_s for soil, FI_{sd} for sediment, = fraction of exposure attributed to site medium (unitless)
CF = conversion factor (1E-6 kg/mg)
AF = AF_s for soil, AF_{sd} for sediment, = soil- or sediment-to-skin adherence factor (mg/cm^2-day)
ABS = absorption fraction (unitless, chemical-specific).

ABS values are provided in the toxicity profiles for each COPC (Appendix C).

Quantification of dermal uptake of constituents from groundwater (future groundskeeper, resident) or surface water (construction worker, resident) depends on a K_p, which describes the rate of movement of a constituent from water across the dermal barrier to the systemic circulation (EPA, 2004a). The equation for dermal uptake of chemicals from water is the same as the equation for dermal uptake of chemicals from soil (Eq. 3.12). DA is calculated differently for inorganic and organic chemicals in water. For inorganic chemicals, DA is calculated from the following equation:

Eq. 3.14

$$DA = (C_w)(FI)(K_p)(ET_w)(CF)$$

where:

DA = dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w = concentration of COPC in water (mg/L)
K_p = permeability coefficient (centimeters per hour [cm/hour])
ET_w = time of exposure (hours/day)
CF = conversion factor (1E-3 liters per cubic centimeter [L/cm^3]).

K_p for organic chemicals varies by several orders of magnitude and is highly dependent on lipophilicity, expressed as a function of the octanol/water partition coefficient (EPA, 2004a). Because the stratum corneum (the outer skin layer) is rich in lipid content, it may act as a sink, initially reducing the transport of chemical to the systemic circulation. With continued exposure and the attainment of steady-state conditions, the rate of dermal uptake increases. Therefore, different equations are used to estimate DA, depending on whether the ET is less than or greater than the estimated time to reach steady state. Non-steady-state exposures occur when either the ET is relatively brief (e.g., showering, for most chemicals) or when intermittent exposure occurs throughout the day (e.g., wading exposure to surface water or washing of hands). For exposure scenarios under which steady state is not reached for a given organic chemical (τ> ET, see below), the following equation is used to calculate DA (EPA, 2004a):

Eq. 3.15

$$DA = 2(FA)(K_p)(C_w)(CF)\sqrt{\left(\frac{6\tau(ET_w)}{\pi}\right)}$$

where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w	=	C_{sw} for surface water, C_{gw} for groundwater, = concentration of COPC in water (mg/L)
FA	=	fraction absorbed from the water (unitless)
K_p	=	permeability coefficient (cm/hour)
CF	=	conversion factor (1E-3 L/cm^3)
τ	=	time for concentration of contaminant in stratum corneum to reach steady state per event (hours)
ET_w	=	time of contact (hour(s)/day).

In cases where steady state is reached (τ<ET), such as where the duration of a bath exceeds the time to reach steady state for a given organic compound, the following equation is used to calculate DA (EPA, 2004a):

Eq. 3.16

$$DA = (FA)(K_p)(C_w)(CF)\left[\frac{ET_w}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w	=	concentration of COPC in water (mg/L)
FA	=	fraction absorbed from the water (unitless)
K_p	=	permeability coefficient (cm/hour)
CF	=	conversion factor (1E-3 L/cm^3)
τ	=	time for concentration of contaminant in stratum corneum to reach steady state per event (hours)
ET_w	=	time of contact (hour[s]/day)
B	=	Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (unitless).

Assuming one exposure event/day allows expressing ET as hour(s)/day, which preserves the dimensional integrity of the equation.

When available, values for K_p and τ are taken from EPA (2004a). For organics that have no K_p values listed, the values are calculated using the following equation (EPA, 2004a):

Eq. 3.17

$$\text{Log}(K_p) = -2.80 + 0.66(\log K_{ow}) - 0.0056(MW)$$

where:

K_p	=	permeability coefficient (cm/hour, calculated)
log K_{ow}	=	log of the octanol/water partition coefficient (unitless)
MW	=	molecular weight.

Where values for τ are not available, they were calculated using the following equation (EPA, 2004a).

Eq. 3.18

$$\tau = 0.105 \times 10^{(0.0056 \times MW)}$$

where:

τ	=	time for concentration of contaminant in stratum corneum to reach steady state (hours, calculated)
MW	=	molecular weight.

Values of K_p and τ used in the BHHRA are summarized in Table 3-3 and documented in Appendix C.

3.3.5 Consumption of Venison

Consumption of venison by the hunter or the hunter's child is evaluated by the following equation:

Eq. 3.19

$$I_v = \frac{(C_v)(IR_v)(EF)(ED)}{(BW)(AT)}$$

where:

I_v	=	ingested dose of COPC in venison (mg/kg-day, calculated)
Cv	=	concentration of COPC in venison (mg/kg)
IRv	=	venison ingestion rate (kg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

4.0 Toxicity Evaluation

Toxicity is defined as the ability of a chemical to induce adverse effects in biological systems. The purpose of the toxicity assessment is two-fold:

- Identify the cancer and noncancer effects that may arise from exposure of humans to the COPC (hazard assessment).
- Provide an estimate of the quantitative relationship between the magnitude and duration of exposure and the probability or severity of adverse effects (dose-response assessment).

The latter is accomplished by the derivation of cancer and noncancer toxicity values, as described in the following sections.

4.1 Evaluation of Carcinogenicity

A few chemicals are known, and many more are suspected, to be human carcinogens. The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect (EPA, 2005). The qualitative aspect is a weight-of-evidence evaluation of the likelihood that a chemical might induce cancer in humans. EPA (2005) recognizes five weight-of-evidence group classifications for carcinogenicity. Formerly, EPA (1986) used a letter-based system to describe the weight of evidence for carcinogenicity. Reference to this former system is included because many of the carcinogenicity assessments listed on the Integrated Risk Information System (IRIS) use the former letter-based system (EPA, 2010f). The five EPA weight-of-evidence classifications are as follows:

- ***Carcinogenic to Humans*** (corresponds to the former Group A - Human Carcinogen).
- ***Likely to be Carcinogenic to Humans*** (includes both the former Group B1 and Group B2-Probable Human Carcinogens)
- ***Suggestive Evidence of Carcinogenic Potential*** (corresponds to the former Group C - Possible Human Carcinogen)
- ***Inadequate Information to Assess Carcinogenic Potential*** (corresponds to the former Group D - Not Classifiable as to Human Carcinogenicity)
- ***Not Likely to be Carcinogenic to Humans*** (corresponds to the former Group E - Evidence of Noncarcinogenicity to Humans).

The toxicity value for carcinogenicity, called a cancer slope factor (SF), is an estimate of potency. SFs are developed only for chemicals in the first three groups and only if the data are sufficient. The SFs are statistically derived from the dose-response curve from the best human or animal study or studies of the chemical. Although human data are often considered to be more reliable than animal data because there is no need to extrapolate the results obtained in one species to another, most human studies have one or more of the following limitations:

- The duration of exposure is usually considerably less than lifetime.
- The concentration or dose of chemical to which the humans were exposed can be approximated only crudely, usually from historical data.
- Concurrent exposure to other chemicals frequently confounds interpretation.
- Data regarding other factors (tobacco, alcohol, illicit or medicinal drug use, nutritional factors and dietary habits, heredity) are usually insufficient to eliminate or quantify confounding effects on the results.
- Most epidemiologic studies are occupational investigations of workers, which may not accurately reflect the range of sensitivities of the general population.
- Most epidemiologic studies lack the statistical power (i.e., sample size) to detect a low, but chemical-related increased incidence of tumors.

Most potency estimates are derived from animal data, which present different limitations:

- It is necessary to extrapolate from results in animals to predict results in humans, usually by estimating an equivalent human dose from the animal dose.
- The range of sensitivities arising from genotypic and phenotypic diversity in the human population is not reflected in the animal models ordinarily used in cancer studies.
- Usually, very high doses of chemical are used, which may alter normal biology, creating a physiologically artificial state and introducing substantial uncertainty regarding the extrapolation to the low-dose range expected with environmental exposure.
- Individual studies vary in quality (e.g., duration of exposure, group size, scope of evaluation, adequacy of control groups, appropriateness of dose range, absence of concurrent disease, sufficient long-term survival to detect tumors with long induction or latency periods).

The SF is usually expressed as "extra risk" per unit dose, that is, the additional risk above background in a population corrected for background incidence. It is calculated using the following equation:

Eq. 4.1

$$SF = (p_{(d)} - p_{(0)})/(1 - p_{(0)})$$

where:

SF	=	chemical-specific slope factor per unit dose $(mg/kg\text{-}day)^{-1}$
$p_{(d)}$	=	the probability of developing cancer at a dose of 1 mg/kg-day of the chemical of interest
$p_{(0)}$	=	the background probability of developing cancer at a dose of 0 mg/kg-day of the chemical of interest.

The SF is expressed as risk per mg/kg-day, shown mathematically as $(mg/kg\text{-}day)^{-1}$. To be appropriately conservative, the SF is usually the 95 percent upper bound on the slope of the dose-response curve extrapolated from high (experimental) doses to the low-dose range expected in environmental exposure scenarios. EPA (2005) assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk, however miniscule it may be.

The oral SF is usually derived directly from the experimental dose data, because oral dose is usually expressed as mg/kg-day. When the test chemical was administered in the diet or drinking water, oral dose first must be estimated from data for the concentration of the test chemical in the food or water, food or water intake data, and body weight data.

IRIS (EPA, 2010f) expresses inhalation cancer potency as a unit risk based on concentration, or risk per microgram of chemical per m^3 of ambient air, shown mathematically as (micrograms per cubic meter [$\mu g/m^3$])$^{-1}$. Because cancer risk characterization requires an SF expressed as risk per mg/kg-day, the unit risk must be converted to the mathematical equivalent of an inhalation cancer SF, or risk per unit dose as $(mg/kg\text{-}day)^{-1}$. Because the inhalation unit risk is based on continuous lifetime exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the unit risk (per $\mu g/m^3$) by 70 kg and by 1,000 µg/mg, and dividing the result by 20 m^3 per day.

4.2 Evaluation of Noncarcinogenic Effects

Many chemicals, whether or not associated with carcinogenicity, are associated with adverse noncarcinogenic effects. The evaluation of noncancer effects (EPA, 1989b) involves the following:

- Qualitative identification of the adverse effect(s) associated with the chemical; these may differ depending on the duration (acute or chronic) or route (oral or inhalation) of exposure.
- Identification of the critical effect for each duration of exposure (i.e., the first adverse effect that occurs as dose is increased).
- Estimation of the threshold dose for the critical effect for each duration of exposure.
- Development of an uncertainty factor (UF); i.e., quantification of the uncertainty associated with interspecies extrapolation, intraspecies variation in sensitivity, severity of the critical effect, slope of the dose-response curve, and deficiencies in the database, in regard to developing a reference dose (RfD) for human exposure.
- Identification of the target organ(s) for the critical effect for each route of exposure.

These information points are used to derive an exposure route- and duration-specific toxicity value called an RfD, expressed as mg/kg-day, which is considered to be the dose for humans, with uncertainty of an order of magnitude or greater, at which adverse effects are not expected to occur. Mathematically, it is estimated as the ratio of the threshold dose to the UF. For purposes of risk assessment, chronic exposure is typically defined as equal to or greater than 7 years, i.e., at least 10 percent of expected life span; subchronic exposure is typically defined as 2 weeks to 7 years. However, professional judgment may be used where exposure durations approach 10 percent of the expected life span. Also, exposure during a critical stage of development, such as a portion of early childhood, may be treated as chronic even if the anticipated exposure duration is considerably less than 10 percent of the expected life span.

IRIS (EPA, 2010f) expresses the inhalation noncancer reference value as a reference concentration (RfC) in units of mg/m^3. Because noncancer hazard characterization requires a reference value expressed as mg/kg-day, the RfC must be converted to an inhalation RfD. Because the inhalation RfC is based on continuous exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the RfC (mg/m^3) by 20 m^3/day and dividing the result by 70 kg.

RfD and RfC values are derived for both chronic and subchronic exposure. Under the assumption of monotonicity (incidence, intensity, or severity of effects can increase, but cannot decrease, with increasing magnitude or duration of exposure), a chronic RfD may be considered sufficiently protective for subchronic exposure, but a subchronic RfD may not be protective for chronic exposure. Currently, subchronic RfD values exist for few chemicals. Subchronic RfD values can be derived from chronic RfD values as follows:

- If the UF applied in the derivation of the chronic RfD (or RfC) does not provide for expansion from subchronic to chronic exposure (e.g., if the chronic RfD was derived from a chronic study), the chronic RfD is adopted as being sufficiently protective for subchronic exposure.

- If the UF applied in the derivation of the chronic RfD (or RfC) contains a component to expand from subchronic to chronic exposure, the subchronic RfD is derived by multiplying the chronic RfD by the factor used to expand from subchronic to chronic exposure (e.g., if a factor of 10 was used to expand from subchronic to chronic exposure, the subchronic RfD would be 10 times larger than the chronic RfD).

Only chronic RfDs and RfCs are used in the risk characterization of this BHHRA.

4.3 Dermal Toxicity Values

Dermal RfDs and SFs are derived from the corresponding oral values, provided there is no evidence to suggest that dermal exposure induces exposure route-specific effects that are not appropriately modeled by oral exposure data. In the derivation of a dermal RfD, the oral RfD is multiplied by the gastrointestinal absorption factor (GAF), expressed as a decimal fraction. The resulting dermal RfD, therefore, is based on absorbed dose. The RfD based on absorbed dose is the appropriate value with which to compare a dermal dose, because dermal doses are expressed as absorbed doses rather than exposure doses. The dermal SF is derived by dividing the oral SF by the GAF. The oral SF is divided, rather than multiplied, by the GAF because the SF is expressed as a reciprocal dose.

4.4 Target Organ Toxicity

As a matter of science policy, EPA assumes dose and effect to be additive for noncarcinogenic effects (EPA, 1989a). This assumption provides the justification for adding the HQ or hazard index (HI) values in the risk characterization for noncancer effects (Section 5.2) resulting from exposure to multiple chemicals, pathways, or media. However, EPA (1989a) acknowledges that adding all HQ or HI values may overestimate hazard, because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism.

Mechanisms of toxicity data sufficient for predicting additivity with a high level of confidence are available for very few chemicals. In the absence of such data, EPA (1989a) assumes that chemicals that act on the same target organ may do so by the same mechanism of toxicity; that is, the target organ serves as a surrogate for mechanism of toxicity. When total HI for all media for a receptor exceeds 1 due to the contributions of several chemicals, it is appropriate to segregate the chemicals by route of exposure and mechanism of toxicity (i.e., target organ) and estimate separate HI values for each target organ.

As a practical matter, because human environmental exposures are likely to involve near- or sub-threshold doses, the target organ chosen for a given chemical is the one associated with the critical effect. If more than one organ is affected by a given chemical at the threshold, then all affected target organs are selected for this chemical. The target organ is also selected on the basis of duration of exposure (i.e., the target organ for chronic or subchronic exposure to low or moderate doses is selected rather than the target organ for acute exposure to high doses) and route of exposure. Because dermal RfD values are derived from oral RfD values, the oral target organ is adopted as the dermal target organ. For some chemicals, no target organ is identified. This occurs when no adverse effects are observed or when adverse effects such as reduced longevity or growth rate are not accompanied by recognized organ- or system-specific functional or morphologic alteration.

4.5 Sources of Toxicity Information Used in the Risk Assessment

Toxicity values were selected for use in the BHHRA based on EPA Office of Solid Waste and Emergency Response Directive 9285.7-53 (EPA, 2003), which prescribes the following hierarchy:

- **Tier 1** values: IRIS (EPA, 2010f) database.
- **Tier 2** values: These are EPA's provisional peer-reviewed toxicity values. The provisional peer-reviewed toxicity values are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.
- **Tier 3** values: These are other toxicity values from additional EPA and non-EPA sources of toxicity information. As stated in the EPA Office of Solid Waste and Emergency Response directive, "priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed." Two common examples of Tier 3 values are the EPA's Health Effects Assessment Summary Tables (EPA, 1997b) and

the California Environmental Protection Agency (2005) Office of Environmental Health Hazard Assessment Toxicity Criteria Database.

The Environmental Council of States-U.S. Department of Defense (2007) has issued a toxicity value hierarchy that basically supports the EPA (2003) hierarchy presented previously but places higher emphasis on the necessity for external peer review.

GAFs used to derive dermal RfD values and SFs from the corresponding oral toxicity values are obtained from the following sources:

- Oral absorption efficiency data compiled by the National Center for Environmental Assessment for the Superfund Health Risk Technical Support Center of EPA
- Federal agency reviews of the empirical data, such as Agency for Toxic Substances and Disease Registry toxicological profiles and various EPA criteria documents
- Other published reviews of the empirical data
- The primary literature.

GAFs obtained from reviews are compared to empirical (especially more recent) data, when possible, and are evaluated for suitability for use in deriving dermal toxicity values from oral toxicity values. The suitability of the GAF increases when the following similarities are present in the oral pharmacokinetic study from which the GAF is derived and in the key toxicity study from which the oral toxicity value is derived:

- The same strain, sex, age, and species of test animal were used.
- The same chemical form (e.g., the same salt or complex of an inorganic element or organic compound) was used.
- The same mode of administration (e.g., diet, drinking water, or gavage vehicle) was used.
- Similar dose rates were used.

Individual COPC-specific toxicity profiles, including sources of the toxicity and GAF values, are included in Appendix C for all of the COPCs evaluated in the BHHRA. Summary toxicity information sufficient to support the risk calculations, including toxicity values, GAFs, target organs, and sources, are provided in Table 4-1.

5.0 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of site-specific contaminants. This is done by combining the intake rates estimated during the exposure assessment with the appropriate toxicity information identified during the toxicity assessment. Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects.

Quantitative expressions are calculated during risk characterization that describe the probability of developing cancer (i.e., ILCRs), or the nonprobabilistic comparison of estimated dose with an RfD for noncancer effects (i.e., HQs and HIs). Quantitative estimates are developed for individual chemicals, exposure pathways, and exposure media for each receptor. These quantitative risk characterization expressions, in combination with qualitative information, are used to guide risk management decisions. Risk characterization, as described in this section, is applied only to COPCs.

Generally, the risk characterization follows the methodology prescribed by EPA (1989a), as modified by more recent information and guidance. EPA methods are designed to be health protective and tend to overestimate rather than underestimate risk (EPA, 1989a; Burmaster and Harris (1993); Cogliano, 1997). The risk results, however, may be overly conservative, because risk characterization involves multiplication of the conservative assumptions built into the estimation of the EPCs, exposure (intake) estimates, and toxicity dose-response assessments.

5.1 Cancer Risk

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime and is called the ILCR. In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (EPA, 1989a):

Eq. 5.1

$$ILCR = (CDI)\,(SF)$$

where:

ILCR = incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated

CDI = chronic daily intake, averaged over 70 years (mg/kg-day)
SF = cancer slope factor (risk per mg/kg-day).

The chronic daily intake (CDI) term in Equation 5.1 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.9 through 3.12 and 3.19 when these equations are evaluated for cancer intakes.

The use of Equation 5.1 assumes that chemical carcinogenesis does not exhibit a threshold and that the dose-response relationship is linear in the low-dose range. Because this equation could generate theoretical cancer risks greater than 1 for high-dose levels, it is considered to be inaccurate at cancer risks greater than 1E-2. In these cases, cancer risk is estimated by the following one-hit model (EPA, 1989a):

Eq. 5.2

$$ILCR = 1 - e^{-(CDI)(SF)}$$

where:

ILCR = incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
$-e^{(CDI)(SF)}$ = the exponential of the negative of the risk calculated using Equation 5.1.

Because all of the risks associated with AP1 COPCs are less than 1E-2, only Equation 5.1 was used in this BHHRA. As a matter of policy, EPA (1986) considers the carcinogenic potency of simultaneous exposure to low doses of carcinogenic chemicals to be additive, regardless of the chemicals' mechanisms of toxicity or sites of action (organs of the body). Cancer risk arising from exposure to multiple chemicals in a given exposure medium and pathway is estimated from the following equation (EPA, 1989a):

Eq. 5.3

$$ILCR_p = ILCR_{(chem\,1)} + ILCR_{(chem\,2)} + \ldots ILCR_{(chem\,i)}$$

where:

$ILCR_p$ = total pathway risk of cancer incidence, calculated
$ILCR_{(chem\ i)}$ = individual chemical cancer risk for the pathway.

The sum of the ILCRs summed across pathways is the total ILCR as shown in the equation below:

Eq. 5.4

$$Total\ ILCR = ILCR_{(p\,1)} + ILCR_{(p\,2)} + \ldots ILCR_{(p\,i)}$$

where:

Total ILCR	=	total incremental lifetime cancer risk across all pathways
$ILCR_{pi}$	=	incremental lifetime cancer risks associate with pathway "*i*."

The total ILCR represents all additional cancer risks posed to a given receptor by contact with contaminants in site environmental media.

Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); as mentioned in Section 2.4.1, this range is referred to as the "NCP risk management range." Risks less than this range are regarded as negligible. A target cancer risk criterion of 1E-5 is used by OEPA and was selected by the PBOW Project Delivery Team as a basis to consider remedial action. Use of this 1E-5 criterion represents a departure from the Army's practice of generally using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations.

5.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with an RfD. The HQ, defined as the ratio of intake to RfD, is estimated as follows (EPA, 1989a):

Eq. 5.5

$$HQ = I \ / \ RfD$$

where:

HQ	=	hazard quotient (unitless, calculated)
I	=	intake of chemical averaged over subchronic or chronic exposure period (mg/kg-day)
RfD	=	reference dose (mg/kg-day).

The I term in Equation 5.4 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.9 through 3.12 and 3.19 when these equations are evaluated for noncancer intakes.

Chemical noncancer hazards are evaluated using chronic RfD values. This approach is different from the probabilistic approach used to evaluate cancer risks. An HQ of 0.01 does not imply a 1-in-100 chance of an adverse effect, but indicates only that the estimated intake is 100 times lower than the RfD. An HQ of unity indicates that the estimated intake equals the RfD. If the HQ is greater than unity, there may be concern for potential adverse health effects.

In the case of simultaneous exposure of a receptor to multiple chemicals, or to a given chemical by multiple pathways, an HI is calculated as the sum of the HQs by the following equation:

Eq. 5.6

$$HI = HQ_1 + HQ_2 + \ldots HQ_i$$

where:

HI = hazard index (unitless, calculated)
HQ_i = hazard quotient for the ith chemical, or for the ith pathway.

A total HI is calculated as the sum of all HI values, including all media and all COPCs, for a given receptor. Calculating a total HI as the sum of HQ values is based on the assumption that the potential for noncancer effects is additive. EPA (1989a), however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism (please see Section 4.4). Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ.

A total target organ HI is calculated by summing the HI values (associated by target organ[s]), across exposure pathways as follows:

Eq. 5.7

$$Total\ Target\ Organ\ HI_a = HI_{p1-a} + HI_{p2-a} + \ldots HI_{pi-a}$$

where:

Total target organ HI_a = total hazard index for target organ "*a*" (unitless, calculated)
HI_{pi-a} = hazard index for target organ "*a*" via pathway "*i*."

HI values of 1 or less indicate that adverse noncancer health effects associated with that target organ of any individual under the exposure assumptions for that receptor are unlikely. If the total target organ HI exceeds a value of 1, then adverse noncancer health effects concerning that target organ and receptor cannot be regarded as unlikely.

5.3 Risk Characterization Results

Cancer and noncancer risk characterization results were evaluated for each receptor and each environmental medium, using the methods described in Sections 5.1 and 5.2. The following subsections describe the risk characterization results for each receptor associated with AP1. Risk summary tables are shown for each receptor as referenced. The detailed quantitative evaluation tables that include the exposure equations presented in Chapter 3.0 and the risk characterization equations presented in Chapter 5.0 are provided in Appendix D. Analytical results used as input in the BHHRA are included in Appendix E.

5.3.1 Current Groundkeeper

The ILCR for the current groundskeeper (Table 5-1) exposed to surface soil both through direct contact and via inhalation of suspended particulates is estimated as 5E-6. This is within the 1E-6 to 1E-4 NCP risk management range and is less than the PBOW cancer risk criterion of 1E-5. The total HI for the current groundskeeper (Table 5-1) is 0.2. This is less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

5.3.2 Future Groundskeeper

The exposure assumptions for the future groundskeeper differ from those of the current groundskeeper (Section 5.3.1) in that the future groundskeeper is assumed to be exposed to total soil rather than surface soil, and the future groundkeeper is also assumed to be exposed to groundwater via direct contact (ingestion and dermal exposure). The risk characterization was run separately for bedrock groundwater exposure and overburden (well) groundwater exposure.

Bedrock Groundwater Use. The total ILCR for the future groundskeeper, assuming hypothetical bedrock groundwater use, is 9E-4 (Table 5-1). This value exceeds both the NCP risk management range and the PBOW target cancer risk criterion of 1E-5. Over 99 percent of this ILCR is associated with benzene (2.7E-4) and arsenic (5.8E-4) in groundwater.

Benzene is a petroleum constituent that is known to be naturally occurring in the limestone groundwater at PBOW (Shaw, 2006), and was found to be prevalent in bedrock groundwater underlying the adjacent LBA site (Shaw, 2010b). Petroleum was reported seeping at depth in well AP1-BEDGW-001 (57.8-59.5 feet bgs; 62.8-64.8 feet bgs; 75.7-75.8 feet bgs) during well installation, and accumulated product was evident in this well during sampling. Also, a petroleum sheen was seen on the surface of downgradient well IT-MNTA-BEDGW-001 (evaluated for risk in the LBA BHHRA [Shaw, 2010b]), which is also one of the highest hydrogen sulfide producers at PBOW, and strong hydrogen sulfide also emanated from well AP1-BEDGW-002.

Arsenic was detected in both AP1 bedrock monitoring wells, AP1-BEDMW-001 and AP1-BEDMW-002, at concentrations ranging from 50.7 to 110 µg/L. It is noted that AP1-BEDGW-002 could only be sampled by bailer because of insufficient yield for low-flow sampling, and AP1-BEDGW-001 had to be sampled via bailer because of the presence of petroleum product. It is also noted that at the nearby LBA site, the intent was to collect 12 groundwater samples from 6 bedrock wells during two sampling events using low-flow sampling method. Of these 12, only

5 could be collected because the wells were dry; of the 5 that were collected, all had to be collected via bailer because of insufficient yield.
The low yield for the AP1 and nearby LBA bedrock monitoring wells, as well as the presence of naturally occurring petroleum, indicates that potable use by a site worker is not a plausible exposure pathway. In addition, the arsenic present in the AP1 bedrock groundwater appears to be unrelated to PBOW activities based on the following observations:

- Arsenic was not detected above background in any of the overlying overburden well samples.
- Arsenic was found to be present at background concentrations in AP1 soil samples. The MDC (31.2 mg/kg) and mean concentration (9.7 mg/kg) of arsenic in total soil are both less than those of PBOW background data set (36.5 and 10.1 mg/kg, respectively).

The ILCR for the future groundskeeper without the contributions of groundwater is 2E-6 (Table 5-2), which is within the NCP cancer risk management range and less than the 1E-5 PBOW cancer risk criterion.

The total HI for the future groundskeeper (Table 5-1) is 11. This exceeds the target HI value of 1, which would seem to indicate that noncancer health effects cannot be regarded as unlikely to occur. Most of this HI is associated with the hypothetical use of bedrock groundwater, which alone represents an HI of 9. As discussed previously for cancer risk to the future groundskeeper, AP1 groundwater is not present in sufficient quantity. Also, note that approximately 90 percent of this HI value is associated with benzene (HQ=3.4), arsenic (HQ=3.6), and thallium (HQ=0.8) in groundwater. As stated above, benzene is not associated with former PBOW operations but is associated with naturally occurring petroleum.

As discussed previously for cancer effects, arsenic was not detected above background concentrations in AP1 overburden groundwater and AP1 soil. The thallium found in a single bedrock groundwater sample (estimated concentration of 5.3 µg/L, which is below the reporting limit of 5.3 µg/L at AP1-BEDGW-001 in May 2009) was not found in the associated filtered sample, indicating that the thallium is associated with suspended sediments. Also, thallium was not detected in this well in the November 2009 sample (Shaw, 2010a). It is noted that thallium analysis is subject to electronic interference, especially at concentrations below the reporting limit, frequently resulting in false positives. Note also that no RfD is currently listed on IRIS; the HQ for thallium is based on an RfD that has recently been withdrawn because the studies are of poor quality (EPA, 2010d).

If the contributions of groundwater pathways are appropriately excluded based on low water yield and naturally poor groundwater quality, the resulting HI for this receptor is 2 (Table 5-2). This exceeds the threshold criterion of 1. Over 90 percent of this value is associated with manganese in soil. However, of the 30 total soil samples collected from AP1, only the sample collected from AP1-SB04 at a depth of 8 to 10 feet bgs exhibited a concentration (4,470 mg/kg) that exceeds the BSC (3,510 mg/kg). Because the BSC is based on an upper tolerance limit of 95 percent, it is statistically expected that up to 5 percent of samples (mathematically 1.5 of the 30 total soil samples collected) from the same background population may exceed the BSC. Thus, the single exceedance of the BSC among the 30 AP1 total soil samples is not unexpected from a statistical perspective and is consistent with the background data set, wherein 1 of 26 manganese samples exceeds the BSC. Also, the ash at seven of eight soil borings, including AP1-SB04, extends to a depth of less than 2.5 feet bgs. The soil at 8 to 10 feet bgs at AP1-SB04 appears to be native soil (clayey silt), and the soil samples collected from this boring at 0 to 1 foot bgs (within the ash layer) and at 3 to 4 feet have concentrations of manganese of only 241 and 871 mg/kg, respectively. Further, manganese concentrations at 8 to 10 feet bgs in the other seven AP1 soil borings were all less than 600 mg/kg. This observation indicates that appreciable amounts of manganese are not leaching or have not leached to the deeper soil, thereby providing further evidence that the BSC exceedance found at depth in boring AP1-SB04 is associated with the native soil rather than the ash. Note that the arithmetic mean concentration of manganese in AP1 total soil (672 mg/kg) is consistent with and slightly less that of the PBOW background data set (729 mg/kg), and the MDC in AP1 total soil (4,470 mg/kg) is less than that of the background data set (13,300 mg/kg). This further indicates that the HQ of manganese at AP1 is associated with concentrations that do not exceed PBOW background.

It is also noted that the HI for the construction worker is based on conservative soil-to-air dust-loading assumptions (Section 3.2.2.1) which result in a predicted air concentration of 0.00014 mg/m^3. This concentration is four orders of magnitude less than the Occupational Safety and Health Administration (OSHA) 8-hour time-weight average permissible exposure limit (PEL) (8-hour time weighted average [TWA]) of 5 mg/m^3 for construction applications and the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) 10-hour TWA (REL [10-hour TWA]) of 1 mg/m^3. The OSHA PEL (8-hour TWA) is regulatorily enforceable and the lower of the OSHA PEL and NIOSH REL TWA values is commonly implemented as a protective value for respiratory protection. Clearly, the predicted conservative concentrations of manganese in air for this receptor meet the NIOSH recommended and OSHA regulatorily enforceable levels. Also, as discussed in the previous paragraph, manganese concentrations in AP1 soil do not exceed background.

If the contributions of manganese to the HI are excluded due to manganese concentrations being consistent with background levels, the resulting HI for the AP1 groundskeeper is 0.2. This is less than the target HI criterion of 1.

Overburden Groundwater Use. The total ILCR for the future groundskeeper, assuming hypothetical use of overburden groundwater, is 2E-6 (Table 5-1). This value is within the NCP risk management range, and is less than the PBOW target cancer risk criterion of 1E-5. Because no carcinogenic COPCs were identified in AP1 overburden groundwater, this ILCR is entirely associated with exposure to total soil.

The total HI for the future groundskeeper, assuming hypothetical use of overburden groundwater, is 15 (Table 5-1). This exceeds the target HI criterion of 1, indicating that noncancer health effects cannot be considered unlikely to occur under this scenario. The HI associated with exposure to overburden groundwater is 13, approximately 95 percent of which is associated with manganese (HQ=7.3) and thallium (HQ=4.7). Manganese was detected at concentrations (32,300 µg/L in May and 8,290 µg/L in November 2009) exceeding the BSC only in well AP1-MW01. Similarly, thallium was detected only in well AP-MW01, but was detected only in the May 2009 sample (34.6 µg/L); it was not detected in any other AP1 sample, including the November 2009 sample from AP1-MW01. It is noted that AP1-MW0l is located upgradient (south) of AP1 and, thus, may not be associated with the ash. Note that no RfD is currently listed on IRIS; the HQ for thallium is based on an RfD that has recently been withdrawn because the studies are of poor quality (EPA, 2010f).

Regardless of the source(s) of manganese and thallium and questions concerning the toxicity of thallium, the overburden groundwater underlying AP1 produces insufficient yield for potable use. Of the six samples collected from the three AP1 wells, only the two samples from AP1-MW01 could be collected using low-flow sampling, and the flow rate of AP1-MW01 in November 2009 was only 42 µg/L, which is less than the 50 µg/L criterion below which samples typically are collected via bailer. All of the other four AP1 overburden samples had to be collected with a bailer because of inadequate recharge for low-flow collection. It is noted that the overburden groundwater underlying the adjacent LBA also was found to produce inadequate yield for potable use (Shaw, 2010b). Therefore, inclusion of the groundwater use pathway exaggerates exposure to this receptor. The total HI for the future groundskeeper excluding use of overburden water of 2 exceeds the target HI criterion. This soil-only exposure scenario is discussed above under “Bedrock Groundwater Use” for this receptor.

5.3.3 Indoor Worker

The exposure assumptions for the future indoor worker include direct contact with surface soil, inhalation of volatiles from subsurface soil, and direct exposure with groundwater via direct contact (ingestion and dermal exposure). The risk characterization was run separately for bedrock groundwater exposure and overburden (well) groundwater exposure.

Bedrock Groundwater Use. The total ILCR for the future indoor worker, assuming hypothetical bedrock groundwater use, is 8E-4 (Table 5-1). This value exceeds both the NCP risk management range and the PBOW target cancer risk criterion of 1E-5. Over 99 percent of this ILCR is associated with benzene (2.7E-4) and arsenic (5.8E-4) in groundwater. As described in Section 5.3.2, benzene is a petroleum constituent that is known to be naturally occurring in the limestone groundwater at PBOW (Shaw, 2006), and petroleum was reported seeping at depth in well AP1-BEDGW-001 and at four of the six wells bedrock wells at the adjacent LBA site (Shaw, 2010b). Also, as discussed in Section 5.3.2, the presence of elevated arsenic in LBA bedrock groundwater does not appear to be related to former site activities. The ILCR for the future indoor worker is 1E-6 if the contribution of bedrock groundwater is appropriately excluded (Table 5-2). This value equals the lower end of the NCP risk management range and is less than the PBOW 1E-5 cancer risk criterion.

The total HI for the future indoor worker (Table 5-1) is 9. This exceeds the target HI value of 1, which would seem to indicate that noncancer health effects cannot be regarded as unlikely to occur. Virtually all of this HI is associated with the hypothetical use of bedrock groundwater. As discussed in Section 5.3.2 for the future groundskeeper, AP1 groundwater is not present in quantities sufficient for use. Also, approximately 90 percent of this HI value is associated with benzene (HQ=3.6), arsenic (HQ=3.4), and thallium (HQ=0.8) in bedrock groundwater. As stated above, benzene is not related to former PBOW operations but is associated with naturally occurring petroleum. As discussed previously for cancer effects, arsenic was not detected above background concentrations in AP1 overburden groundwater and was found to be present in soil at background concentrations. The thallium found in a single bedrock groundwater sample (estimated concentration below the reporting limit of 5.3 µg/L at AP1-BEDGW-001 in May 2009) was not found in the associated filtered sample, indicating that the thallium is associated with suspended sediments. It is also noted that thallium was not detected in this well in the November 2009 sample. Thallium analysis is also subject to electronic interference, especially at concentrations below the reporting limit, frequently resulting in false positives. Therefore, it appears that arsenic and thallium reported in bedrock groundwater are unlikely to be associated with former PBOW activities. Note also that no RfD is currently listed on IRIS; the HQ for

thallium is based on an RfD that has recently been withdrawn because the studies are of poor quality (EPA, 2010f).

If the contributions of hypothetical bedrock groundwater are excluded because of low yield and naturally poor quality as described in Section 5.3.2, the resulting HI for the indoor worker is 0.008 (Table 5-2). This is far less than the target criterion of 1 and suggests that adverse noncancer health effects are unlikely.

Overburden Groundwater Use. The total ILCR for the future indoor worker, assuming hypothetical use of overburden groundwater, is 1E-6 (Table 5-1). This value equals the lower end of the NCP risk management range and is less than the PBOW target cancer risk criterion of 1E-5. Because no carcinogenic COPCs were identified, this ILCR is entirely associated with exposure to total soil.

The total HI for the indoor worker is 13, assuming hypothetical use of overburden groundwater (Table 5-1). This exceeds the target HI criterion of 1, indicating that noncancer health effects cannot be considered unlikely to occur under this scenario. Virtually all of this value is associated with assumed exposure to groundwater. Approximately 95 percent of this HI is associated with manganese (HQ=7.3) and thallium (HQ=4.7). Manganese was detected at concentrations (32,300 µg/L in May and 8,290 µg/L in November 2009) exceeding the BSC only in well AP1-MW01. Similarly, thallium was detected only in well AP-MW01, but was detected only in the May 2009 sample (34.6 µg/L); it was not detected in any other AP1 sample, including the November 2009 sample from AP1-MW01. AP1-MW0l is located upgradient (south) of AP1 and thus may not be associated with the ash. Note also that no RfD is currently listed on IRIS; the HQ for thallium is based on an RfD that has recently been withdrawn because the studies are of poor quality (EPA, 2010f).

Overburden groundwater underlying AP1 produces insufficient yield for potable use, as described in Section 5.3.2. Therefore, regardless of the source(s) of the overburden groundwater COPCs, inclusion of the groundwater use pathway exaggerates overall exposure. If the use of overburden groundwater is appropriately excluded, the total HI for the future indoor worker is 0.008, which is far less than the target HI criterion. This soil-only exposure scenario is discussed above under “Bedrock Groundwater Use” for this receptor.

5.3.4 Construction Worker

The construction worker is assumed to be exposed to total soil through direct contact and via inhalation of suspended particulates, and to sediment and surface water via direct contact. The

ILCR for the AP1 construction worker (Table 5-1) is estimated as 8E-7. This is less than both the 1E-6 to 1E-4 NCP risk management range and the PBOW cancer risk criterion of 1E-5.

The total HI for the construction worker (Table 5-1) is 8. This exceeds the target HI value of 1. Therefore, noncancer health effects cannot be regarded as unlikely to occur. Approximately 90 percent of this value is associated with manganese in total soil (HQ=6.8). As mentioned in Section 5.3.2, the arithmetic mean concentration of manganese in AP1 total soil is slightly less than that of the PBOW background data set, and the MDC is less than that of the background data set. Also, only 1 of the 30 total soil samples exceeds the BSC. Because the BSC is based on an upper tolerance limit of 95 percent, statistically, 5 percent of samples (or 1.5 of the 30 total soil samples collected) may be expected to exceed the BSC; thus, the single exceedance of the BSC in not unexpected and is consistent with the PBOW background data set, wherein 1 of 26 background samples exceeds the BSC for manganese. In summary, manganese in AP1 soil does not exceed PBOW background concentrations.

It is also noted that the HI for the construction worker is based on conservative soil-to-air dust-loading assumptions (Section 3.2.2.1) and results in a predicted manganese air concentration of 0.00048 mg/m^3. This concentration is four orders of magnitude less than the OSHA PEL (8-hour TWA) of 5 mg/m^3 for construction applications and the NIOSH REL (10-hour TWA) of 1 mg/m^3. The OSHA PEL (8-hour TWA) is regulatorily enforceable, and the lower of the OSHA PEL and NIOSH REL TWA values is commonly implemented as a protective value for respiratory protection. Clearly, the conservatively predicted concentrations of manganese in air for this receptor meet the regulatorily enforceable and NIOSH-recommended levels. Also, as discussed in the previous paragraph, manganese concentrations in AP1 soil do not exceed those of PBOW background.

If the contributions of manganese to the HI are excluded due to manganese concentrations being consistent with background levels, the resulting HI for the AP1 construction worker is 0.9. This is less than the target HI criterion of 1.

5.3.5 Resident

The exposure assumptions for the resident include direct contact with total soil, inhalation of particulates from total soil, inhalation of volatiles from subsurface soil, direct exposure to sediment and surface water (ingestion and dermal exposure), and direct exposure with groundwater via direct contact (ingestion and dermal exposure). The risk characterization was run separately for bedrock groundwater exposure and overburden (well) groundwater exposure. The ILCR was calculated assuming exposure during a combined 30-year child/adult exposure

duration, whereas separate noncancer HI values were calculated for the young child and adult life stages (refer to Section 3.1.3.5). The results of each are described below.

Bedrock Groundwater Use. The total ILCR for the resident, assuming bedrock groundwater exposure, is 6E-3 (Table 5-1). This value exceeds both the NCP risk management range and the PBOW target cancer risk criterion. Over 99 percent of this ILCR is associated with arsenic (2.5E-3), benzene (3.7E-3), and naphthalene (3.0E-4) in groundwater. As discussed in Section 5.3.2, the presence of elevated arsenic in AP1 bedrock groundwater does not appear to be related to former site activities. As described in Section 5.3.2, benzene is a petroleum constituent that is known to be naturally occurring in the limestone groundwater at PBOW (Shaw, 2006), and during well installation, petroleum was observed seeping at depth from well AP1-BEDGW-001 as well as from four of the six monitoring wells at the adjacent LBA site (Shaw, 2010b). Naphthalene is also a naturally occurring constituent in petroleum. Evidence that the naphthalene found in AP1 bedrock groundwater is not related to PBOW activities includes the following observations: 1) Naphthalene and other petroleum-related compounds were not detected in the overlying overburden groundwater, and 2) naphthalene was not identified as a soil COPC. Further, as discussed in Section 5.3.2, bedrock groundwater underlying the AP1 does not provide adequate yield for tap water use. All bedrock groundwater samples had to be collected via bailer except those from AP-BEDGW-001, and the sample collected from this well in November 2009 had a flow rate of 42 µg/L, which is less than the 50 µg/L criterion typically used for low-flow collection. Therefore, if the bedrock groundwater use is appropriately excluded, the ILCR for the resident is 9E-6. This value is within the NCP risk management range and meets the PBOW 1E-5 cancer risk criterion.

The total HI for the child resident, assuming bedrock groundwater exposure, is 135 (Table 5-1). This exceeds the target HI value of 1, indicating that noncancer health effects cannot be regarded as unlikely to occur. Virtually all of this HI is associated with exposure to bedrock groundwater, and approximately 90 percent of the groundwater HI value is associated with benzene (HQ=70), arsenic (HQ=23), naphthalene (HQ=12), and xylenes (HQ=15). The non-site-relatedness of arsenic, benzene, and naphthalene are discussed in the preceding paragraph. Similar to benzene and naphthalene, xylenes are a component of naturally occurring petroleum. Xylenes appear to be unrelated to former PBOW activities based on the observations that xylenes were not detected in the overlying overburden unit or in AP1 soil.

As discussed in Section 5.3.2, bedrock groundwater underlying AP1 does not provide adequate yield for potable use. Therefore, if the contribution of bedrock groundwater is appropriately excluded, the resultant HI for the child resident is 0.7. This meets the target HI, indicating that

adverse noncancer health effects are unlikely to result from exposure by the child resident receptor to AP1 total soil, sediment, and surface water (Table 5-2).

The total HI for the adult resident, assuming bedrock groundwater exposure, is 58 (Table 5-1). This exceeds the target HI value of 1, indicating that noncancer health effects cannot be regarded as unlikely to occur. Similar to the child resident discussed above, virtually all of this HI is associated with exposure to bedrock groundwater, and approximately 90 percent of the groundwater HI value is associated with benzene (HQ=30), arsenic (HQ=10), naphthalene (HQ=5), and xylenes (HQ=7). The non-site-relatedness of these four compounds is discussed for the child resident in the preceding paragraphs. Also, as discussed above, bedrock groundwater underlying the AP1 provides insufficient yield to consider as a source of residential groundwater. Therefore, the contribution of bedrock groundwater may be appropriately excluded; the resultant HI for the adult resident is 0.1. This meets the target HI, indicating that adverse noncancer health effects are unlikely to result from exposure by the adult resident receptor to AP1 total soil, sediment, and surface water (Table 5-2).

Overburden Groundwater Use. The total ILCR for the future resident, assuming overburden groundwater exposure, is 9E-6 (Table 5-1). This value is within the NCP risk management range and is less than the PBOW target cancer risk criterion. Because none of the overburden groundwater COPCs are carcinogenic, the ILCR for this receptor is associated with exposure to total soil, sediment, and surface water.

The total HI for the child resident, assuming overburden groundwater exposure, is 82 (Table 5-1). This exceeds the target HI value of 1, which would seem to indicate that noncancer health effects cannot be regarded as unlikely to occur. Approximately 94 percent of this HI is associated with manganese (HQ=46) and thallium (HQ=31). Manganese was detected at concentrations (32,300 µg/L in May and 8,290 µg/L in November 2009) exceeding the BSC only in well AP1-MW01. Similarly, thallium was detected only in well AP-MW01, but was detected only in the May 2009 sample (34.6 µg/L); it was not detected in any other AP1 sample, including the November 2009 sample from AP1-MW01. AP1-MW0l is located upgradient (south) of AP1 and thus may not be associated with the ash. Note also that no RfD is currently listed on IRIS; the HQ for thallium is based on an RfD that has recently been withdrawn because the studies are of poor quality (EPA, 2010f).

Regardless of the source(s) of manganese and thallium and questions concerning the toxicity of thallium, overburden groundwater underlying AP1 produces insufficient yield for potable use, as described in Section 5.3.2. Therefore, regardless of the source(s) of the overburden groundwater

COPCs, inclusion of the groundwater use pathway exaggerates overall exposure. If the groundwater pathway is appropriately excluded, then the total HI for the child resident exposed to AP1 total soil, sediment, and surface water is 0.7 (Table 5-2). This value is meets the target HI criterion of 1.

The total HI for the adult resident, assuming overburden groundwater exposure, is 35 (Table 5-1). This exceeds the target HI value of 1, which would seem to indicate that noncancer health effects cannot be regarded as unlikely to occur. Approximately 95 percent of this HI is associated with manganese (HQ=20) and thallium (HQ=13). As discussed above for the child resident, these inorganic COPCs may not be associated with the ash, and the HQ of thallium is highly questionable.

Overburden groundwater underlying AP1 produces insufficient yield for potable use, as described in Section 5.3.2. Therefore, regardless of the source(s) of the overburden groundwater COPCs, inclusion of the groundwater use pathway exaggerates overall exposure. If the groundwater pathway is appropriately excluded, then the total HI for the adult resident exposed to AP1 total soil, sediment, and surface water is 0.1 (Table 5-2), which meets the target HI criterion of 1.

5.3.6 Adult Hunter

The ILCR for the adult hunter (Table 5-1) exposed to surface soil both through direct contact and via the ingestion of venison is estimated as 3E-7. This is less than the 1E-6 to 1E-4 NCP risk management range and than the PBOW cancer risk criterion of 1E-5.

The total HI for the adult hunter is (Table 5-1) is 0.0009. This is far less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

5.3.7 Hunter's Child

The ILCR for the hunter's child (Table 5-1) exposed to surface soil via the ingestion of venison from deer which grazed on site cannot be quantified because none of the carcinogenic COPCs in surface soil bioaccumulates in food. Cancer risks associated with PBOW to this receptor are regarded as de minimis and less than the 1E-6 to 1E-4 NCP risk management range and the PBOW cancer risk criterion of 1E-5.

The total HI for the hunter's child (Table 5-1) likewise cannot be quantified because none of noncancer COPCs in surface soil bioaccumulates in food. This indicates that noncancer health effects are unlikely to occur.

6.0 Uncertainty Analysis

The primary objective of the BHHRA is to characterize and quantify potential human health risks. However, these risks are estimated using incomplete and imperfect information that introduces uncertainties at various stages of the risk assessment process. Uncertainties associated with earlier stages of the risk assessment become magnified when they are linked with other uncertainties in the latter stages. Reliance on a simplified numerical presentation of dose rate and risk without consideration of uncertainties, limitations, and assumptions inherent in their derivation can be misleading. For example, the calculated ILCR for a given scenario "A" may be 1E-5 (meets the PBOW risk criterion) and that of scenario "B" may be 5E-5 (exceeds the PBOW risk criterion). However, if the uncertainties associated with scenario "B," for instance, span orders of magnitude and the ILCR is regarded as biased high, it is not unlikely that scenario "A" actually presents a higher risk of developing cancer.

The chief goal of this analysis is to evaluate uncertainties and present them in context of their potential impact on the interpretation of the risk assessment results and the types of environmental management decisions that may be based on these results. The uncertainty analysis does not exhaustively describe all potential uncertainties but presents those that have the largest implications for the interpretation of the risk assessment results. This analysis also summarizes the types and, as applicable, the magnitude of the uncertainties at each stage of the risk assessment. Although the discussion in the following sections includes generic uncertainties that are common to the state of human health risk assessment practice overall (e.g., additivity of health effects in the risk characterization), the uncertainty analysis focuses on the sets of uncertainties that are specific to AP1.

6.1 Types of Uncertainty

Uncertainties in risk assessment are categorized into two general types: 1) variability inherent in the (true) heterogeneity of the data set, measurement precision, and measurement accuracy; and 2) uncertainty that arises from data gaps. Estimates of the degree of variability tend to decrease as the sample size increases. This is because larger data sets are less impacted by individual samples/measurements and typically allow for greater accuracy. Uncertainty that arises from data gaps is addressed by applying models and assumptions. Models are applied because they represent a level of understanding to address certain exposure parameters that are impractical or impossible to measure (e.g., COPC concentrations in air that would result from groundwater use that has not yet occurred—or may never occur—at the site). Assumptions represent an educated estimate to address information that is not available (e.g., additivity of carcinogens).

6.2 Sources of Uncertainty

The discussion in the following subsections provides an overview of uncertainty, with a focus on those sources that are most likely to affect interpretation of the risk assessment results.

6.2.1 Sample Selection

Soil samples were collected from within the former AP1 area where ash waste was deposited. The well locations were selected from within and adjacent to AP1, including downgradient areas. Surface water and sediment samples were collected along the unnamed tributary to Plum Brook in the vicinity of AP1 that had potentially been impacted by AP1 materials. The sample locations appear to be representative of the site, and no information suggests that they have introduced an identifiable bias.

6.2.2 Laboratory Analysis

State-of-the-practice SW-846 laboratory methods were used for analysis of the RI samples (Shaw, 2010a). For metal in groundwater, this included Method 6010b, which utilizes inductively coupled plasma spectrometry. This method is subject to electronic interferences, particularly at concentrations less than the reporting limit. Although thallium was identified as a COPC in bedrock groundwater, the only detection among the four AP1 bedrock groundwater samples was an estimated concentration of 5.3J µg/L (May 2009 sample from well AP1-BEDGW-001); thallium was not detected in the filtered sample from this same well. Use of this detection likely introduces a high bias to the risk calculations for receptors assumed to use bedrock groundwater. However, because AP1 bedrock groundwater was identified as a unsuitable source of potable water due to naturally poor quality and unreliable yield (Section 5.3.2), inclusion of this sample does not affect overall risks if AP1 bedrock groundwater use is appropriately excluded.

6.2.3 Exposure-Point Concentration Estimates

Uncertainty is introduced in the statistical approach used to calculate the EPCs. As stated in the HHEM (EPA, 1989a), the average concentration of the site should be used as the concentration term. Generally, a UCL is used to account for the uncertainty of using a sample data set to estimate the true population mean concentration for the site. ProUCL Version 4.0 software (EPA, 2010a) was used to calculate the EPCs for those media with five or more samples. However, as is readily observed by reviewing the ProUCL output (Appendix B), the calculation of the UCL can vary with methodology. It is unclear as to whether the UCL value of a specific EPC would result in an underestimate or overestimate of the true population mean. However, the general use of a UCL on all the data sets, even given the uncertainty as to whether a given method provides full coverage at 95 percent confidence, would result in general overestimation of the population

mean and associated risks. Therefore, as intended by the guidance (EPA, 1989a), this practice of using the UCL as the EPC (note that the MDC is used as the EPC if the UCL exceeds the MDC) introduces bias that tends to overestimate the population mean and the resultant risk values.

The bedrock groundwater, sediment, and surface water data sets have fewer than five samples. Thus, the MDC was used as the EPC for these data sets. Use of the MDC likely introduces a high bias to the risk values.

6.2.4 Land-Use Assumptions/Receptor Selection

The current groundskeeper is intended to represent an on-site worker under the current land use as NASA-controlled property. Because there is currently no identified NASA activity at AP1, the use of this receptor likely overestimates risks and hazards to a current site worker. The assumed future use of the hunter and the hunter's child are reasonable, as other areas within PBOW may currently be legally hunted by permit.

Unrestricted land use, including residential use, is a reasonable assumption for the future at AP1, given the rural residential use of property adjacent to the PBOW facility. The assumption that either the overburden or bedrock groundwater will be used as a potable water source in the future is unlikely for reasons described in the following paragraphs.

The use of AP1 bedrock groundwater is regarded as unlikely because it contains natural petroleum and hydrogen sulfide, which can be commonly observed in area quarries (Shaw, 2005). A strong hydrogen sulfide odor was observed emanating from well AP1-BEDGW-001 during sample collection; downgradient well IT-MNTA-BEDGW-001 (evaluated as part of the LBA [Shaw, 2010b]) is one of the highest hydrogen sulfide producers on PBOW. The hydrogen sulfide makes the water distasteful, produces nuisance odors, and is damaging to metal components, including plumbing. Petroleum hydrocarbon seepage was noted on the rock cores at depth of well AP1-BEDGW-001 and on the cores of four of the six nearby LBA bedrock wells (Shaw, 2010b). Petroleum sheens have also been noted on the water surface of these wells and that of IT-MNTA-BEDGW-001. Also, AP1-BEDGW-002 could only be sampled by bailer because of insufficient yield for low-flow sampling, and AP1-BEDGW-001 had to be sampled via bailer because of the presence of petroleum product. It is also noted that at the nearby LBA site, the intent was to collect 12 groundwater samples from 6 bedrock wells during two sampling events using low-flow sampling method. Of these 12, only 5 could be collected because the wells were dry; of the 5 that were collected, all had to be collected via bailer because of insufficient yield. Based on the inability to collect bedrock groundwater samples via low-flow methodology

at the AP1 and nearby LBA wells, it is concluded that the bedrock unit in the area of AP1 yields little water.

Overburden groundwater throughout much of PBOW has been found to be typically of low yield, and is regionally and seasonally discontinuous (Shaw, 2006). This low yield was also observed with respect to AP1 groundwater. Of the three AP1 overburden groundwater monitoring wells, only AP1-MW01 could be sampled using low-flow sampling. Also, the flow rate of AP1-MW01 was actually less than the criterion for low-flow sampling of 50 milliliters per minute in November 2009. Note that potable wells need to provide a flow rate that is orders of magnitude greater.

In summary, use of the bedrock groundwater and overburden groundwater as a potable source at AP1 is regarded as implausible for the following reasons: 1) Both bedrock and overburden groundwater yield water volumes that are clearly inadequate; 2) bedrock groundwater has naturally occurring petroleum and hydrogen sulfide constituents that make the water unsuitable for potable or industrial use, regardless of yield; 3) this poor bedrock quality is associated with the presence of hydrogen sulfide off-gassing, a concern with respect to nuisance odors and potential health issues; 4) no residential wells in the area have been identified as potable; and 5) municipal water is available in the area.

6.2.5 Exposure Assumption Values

The exposure assumption values used in the exposure assessment (Table 3-1) are selected to represent either an upper bound (e.g., 95th percentile) or mid-range value, depending on the particular parameter. Mathematically combining these terms in exposure equations is generally thought to result in decidedly conservative exposure estimations (Cogliano, 1997; Burmaster and Harris, 1993). However, this conservativeness is associated with the state of risk assessment practice, which attempts to focus on the upper end of exposure possibilities rather than more realistic levels of exposure, and not on assumptions made specifically for AP1.

6.2.6 Groundwater-to-Air Household Model

The groundwater-to-air household model (EPA, 1991b) has considerable associated uncertainties. Some parameters that affect the model include the air exchange rate of the house (which can vary with the season) level of groundwater usage, and size of the house. EPA (1991b) states that the model assumes a four-member household that uses 720 L/day of water, a home with a volume of 150 m^3, and 0.25 household air exchanges per hour. The *Exposure Factors Handbook* (EPA, 1997a) lists the following information for the average four-person home: household use of 892 L/day (4 × 223 L/day), volume of 431 m^3, and air exchange rate of 0.63 volumes per hour. If the values from the *Exposure Factors Handbook* were used instead of the

default values from EPA (1991b), the resultant estimated household air concentrations would be less than those estimated in the BHHRA by a factor of nearly 5. In summary, the selection of the groundwater-to-air model parameter values used by EPA (1991b) may contribute a conservative bias to the resultant risk estimates.

6.2.7 Toxicity Assessment

Uncertainties associated with the toxicity assessment include those regarding development of the health effects criteria values, the classification of potential carcinogenicity, the extrapolation of exposure route-specific toxicity values to other routes of exposure, and the extrapolation of toxic effects observed in animal studies to potential adverse effects in humans. A general summary of these uncertainties is provided in the following paragraphs.

The development of health effects criteria for noncancer effects involves considerable professional judgment. An uncertainty factor of up to 10 may be applied to a toxicologically identified benchmark dose or concentration to address the unknown regarding each of the following (EPA, 1989b): lowest-observed-adverse-effects level to no-observed-adverse-effects level, subchronic-to-chronic extrapolation, route-to-route extrapolation, and species-to-species extrapolation. A “modifying factor” of 10 or less is likewise applied in the development of RfDs and RfC, using professional judgment. This modifying factor is intended to address gaps in the database and steepness of the dose-response curve. In practice, the overall UF, derived by multiplying the individual uncertainty factors by the modifying factor, associated with RfD and RfC values may span up to four orders of magnitude.

This BHHRA used an RfD for thallium that was withdrawn from IRIS (EPA, 2010f) in September 2010. This RfD was withdrawn because the thallium studies were judged to be of poor quality. To account for this poor quality, EPA formerly included a UF of 3,000, which is the maximum that EPA uses for verified RfDs. Inclusion of an RfD for thallium with this high UF is likely to introduce a conservative bias. The fact that EPA has withdrawn the RfD for thallium should be considered in any environmental decision related to the potential effects of thallium on human health.

The EPA weight-of-evidence classification system for carcinogens is used to examine and classify chemical agents with respect to their carcinogenic potential. Most EPA potential carcinogens are classified based on animal data, without sufficient human data to support a causal association (i.e., former Group B2; refer to Section 4.1). Also, the linearized multistage (LMS) mathematical model was used to extrapolate values from relatively high-dose rodent studies to relatively low-dose human exposures in the development of SFs for these compounds.

This application of the LMS model is the subject of much controversy. Thus, the LMS approach used to develop SFs, combined with other assumptions, tends to overestimate potential risks.

Overall, the toxicity values, assuming similar effects between humans and test species, tend to result in overestimates of noncancer hazards or cancer risks. However, it is possible that a given chemical can elicit a toxic response in humans that is not observed in the laboratory species studied or that humans may be more sensitive to a given chemical. In this instance, it is possible for the use of the toxicity values to result in underestimates of risks/hazards.

6.2.8 Risk Characterization

It is assumed that the effects of simultaneous exposures to multiple carcinogens at a site are additive. Likewise, it is assumed that noncancer effects of contaminants are additive if they have a similar mechanism of toxicity. In risk assessment practice, it is assumed that the effects of chemicals that affect the same target organ are additive unless chemical-specific information would dictate otherwise. However, chemicals in combination may act additively, synergistically, or antagonistically or may not influence one another at all. Therefore, depending on the interactive effects (if any), the risk characterization approach to multiple contaminants may lead to either underestimates or overestimates of potential risk/hazard.

6.2.9 Evaluation of Selected COPCs for Site Relatedness

As described in Section 2.4.3, a comparison of naturally occurring metals is performed in two steps. The first is a comparison to BSCs; a chemical whose MDC does not exceed the BSC is assumed to be related to background and thus eliminated from further evaluation. The second step is performed for selected metals and organic compounds during the risk characterization step, after exposure calculations are performed which include the potential background-related contributions as part of the overall ILCR and HI results.

For inorganics, this risk characterization background evaluation step typically includes a statistical comparison of the site data set to the background data set using the WRS statistical test as appropriate (Section 2.4.3.2). The WRS output and box-and-whisker plots are provided in Appendix E. Note that no suitable background data sets exist for overburden groundwater, sediment, or surface water. Also, the AP1 bedrock groundwater data set was considered to be too small for statistical testing.

The WRS results for surface soil (p=0.01) and total soil (p=0.000005) confirm that beryllium concentrations found in AP1 surface and total soil are significantly different and are greater than those found in PBOW background; therefore, these beryllium concentrations are assumed to be

related to former site operations. The WRS results indicate that manganese concentrations in AP1 total soil are significantly different from those found in PBOW background. However, the mean manganese concentration detected in AP1 total soil (672 mg/kg) is slightly less than the mean concentration detected in the PBOW background soil (729 mg/kg). It is further noted that only one total soil sample (AP1-SB04 at 8 to 10 feet bgs) had a manganese concentration that exceeded the BSC. As described in Section 5.3.2, this sample was collected from several feet below the ash layer, the overlying soil samples collected from within the ash layer (0 to 1 foot bgs) and below the ash layer (871 mg/kg at 3 to 4 feet bgs) do not have elevated manganese concentrations. Also, manganese concentrations at 8- to 10-foot bgs in the other seven AP1 soil borings were all less than 600 mg/kg, which demonstrates that leaching of manganese from the ash layer to the underlying soil has not appreciably occurred. These results collectively indicate that the elevated manganese concentration found in the 8 to 10 feet bgs AP1-SB04 sample is not related to former site operations. Aluminum in both AP1 surface soil (p=0.25) and total soil (p=0.42) are shown to be at background levels, but this had little effect on the risk characterization results.

A qualitative background evaluation was also performed for petroleum-related organic compounds observed in AP1 bedrock groundwater, most notably BTEX compounds as well as naphthalene. These compounds are petroleum constituents that are known to be naturally occurring in the limestone groundwater at PBOW (Shaw, 2006). Petroleum was reported seeping at depth in well AP1-BEDGW-001 and in four of the six bedrock monitoring wells from the nearby LBA site (see Section 5.3.2). Based on the observation of petroleum in the rock cores during drilling and the known regional presence of petroleum associated with the limestone bedrock, the observed elevated concentrations of the BTEX compounds and naphthalene that drive risks/hazards to a hypothetical bedrock groundwater user are not regarded as related to former PBOW activities.

The noncancer hazards associated with overburden groundwater use are driven by the presence of manganese and thallium. Both of these were elevated only in upgradient well AP1-MW01, with thallium being detected only in the May 2009 sample. Because this well is upgradient of AP1 and the other samples were not elevated with respect to manganese, it is possible that the thallium and manganese concentrations reported in AP1-MW01 are not related to the former ash pit.

7.0 Summary, Conclusions, and Recommendations

7.1 Summary

The BHHRA was conducted to evaluate cancer risk and noncancer hazards associated with AP1 surface soil, subsurface soil, bedrock groundwater, overburden groundwater, surface water, and sediment. A risk-based screening approach was used to identify COPCs and focus the risk assessment on those chemicals detected at AP1 that may contribute appreciably to risk or hazard. The sampled media were screened against the respective RBSCs, and inorganics in bedrock groundwater and soil were also screened against BSCs. COPCs for the various media were identified based on this screening. Exposure and risk/hazard associated with the COPCs were evaluated using the following receptors (media evaluated in parentheses):

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil, groundwater)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only], groundwater)
- Current/future construction worker (total soil, surface water, sediment)
- Future resident (total soil, surface water, sediment, overburden groundwater, bedrock groundwater)
- Future adult hunter (surface soil, including venison pathway)
- Future hunter's child (surface soil [venison pathway only]).

Each receptor scenario that includes groundwater was run separately for overburden groundwater and bedrock groundwater. Because groundwater yield was found to be insufficient for potable use in the overburden and bedrock units underlying AP1, and the AP1 bedrock groundwater was observed to be of naturally poor quality due to the presence of petroleum and hydrogen sulfide, the receptors evaluated for potable groundwater use were also evaluated assuming no groundwater use. The resident was evaluated for noncancer hazards separately for the young child (ages 1 through 6 years) and adult life stages.

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk criteria (ILCR>1E-5) are shown as bolded and exceedances of the noncancer hazard criterion (HI>1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics:

- Current groundskeeper: ILCR = 5E-6; HI = 0.21
- Future groundskeeper – bedrock groundwater use: ***ILCR = 9E-4; HI = 11***
- Future groundskeeper – overburden groundwater use: ILCR = 2E-6; ***HI = 15***
- Future groundskeeper – excluding groundwater use: ILCR = 2E-6; HI = 2 (0.2 excluding background-related manganese [inhalation pathway])
- Indoor worker – bedrock groundwater use: ***ILCR = 8E-4; HI = 9***
- Indoor worker – overburden groundwater use: ILCR = 1E-6; ***HI = 13***
- Future indoor worker – excluding groundwater use: ILCR = 1E-6; HI = 0.008
- Construction worker: ILCR = 8E-7; HI = 8 (0.9 excluding background-related manganese [inhalation pathway])
- Resident – bedrock groundwater use: ***ILCR = 6E-3***; ***child HI = 135***; ***adult HI = 58***
- Resident – overburden groundwater use: ILCR = 9E-6; ***child HI = 82***; ***adult HI = 35***
- Resident – excluding groundwater use: ILCR = 9E-6; child HI = 0.7; adult HI = 0.1
- Hunter: ILCR = 3E-7; HI = 0.0009
- Hunter's child: None of the COPCs is bioaccumulative; risks and hazards are assumed to be de minimis.

7.2 Conclusions

The ILCR and HI values for the two current exposure scenarios (current groundskeeper and construction worker) each meet the PBOW cancer risk criterion (i.e., 1E-5) and the noncancer hazard criterion (i.e., HI$\leq$1). Note that the noncancer hazard criterion is met for the construction worker only if the contribution of background-related manganese is appropriately excluded. An HI value exceeding the HI of 1 for the construction worker (HI of 8), calculated in the risk characterization, is nearly entirely associated with the inhalation of this background-related manganese in soil, using the output of a conservative dust-loading model. Even so, the output of this model is four orders of magnitude less than regulatorily enforceable PELs or recommended RELs for construction areas. Note that no construction is currently planned at AP1.

Each of the potential future exposure scenarios that does not assume potable use of groundwater also meets the PBOW risk and hazard criteria. Note that the noncancer hazard criterion for the future groundskeeper is met only if the contribution of background-related manganese is appropriately excluded. An HI value of 2, calculated in the risk characterization for the future

groundskeeper, is nearly entirely associated with the inhalation of this background-related manganese in soil, using the output of a conservative dust-loading model. As described in the preceding paragraph for the construction worker, the output of this model is four orders of magnitude less than regulatorily enforceable PELs or recommended RELs for construction areas. Note that no groundskeeping appears to have occurred at AP1 in recent years, except immediately along Maintenance Road. Thus, the current groundskeeper scenario, which assumes a full-time, 25-year employee who works exclusively at the AP1 for 250 days per year, appears to greatly overestimate the exposure levels of any current on-site worker or other current receptor.

The cancer risks associated with the following future receptors assumed to use bedrock groundwater as a hypothetical source of tap water exceed the NCP risk management range and PBOW cancer risk criterion: future groundskeeper, future indoor worker, and resident. Each of these also exceeds the target HI criterion of 1. The HI for each of these under the assumption of overburden groundwater use also exceeds the NCP risk management range and the PBOW cancer risk criterion.

The cancer risks and cancer hazards associated with bedrock groundwater are nearly entirely attributable to natural petroleum-related BTEX compounds and arsenic. The noncancer hazards associated with overburden groundwater are due to manganese and thallium from upgradient well AP1-MW01 (thallium was detected only in one sample); it is unclear if these concentrations are due to former site activities. Use of either the overburden or bedrock groundwater is regarded as implausible because of insufficient yield. Additionally, the naturally poor quality of the bedrock groundwater and associated hydrogen sulfide off-gassing make it unsuitable as a potable source. The readily available municipal water supply obviates the need for use of groundwater as a potential source of tap water in the general vicinity of PBOW.

7.3 Recommendations

No remedial actions or further investigation of AP1 media are recommended. If the contributions of exposure to groundwater and apparent background-related manganese are appropriately excluded, none of the AP1 receptors had ILCRs or HIs that exceed the PBOW target criteria or the NCP risk management range. This indicates that the associated environmental media at AP1 are unlikely to pose an unacceptable cancer risk to any receptor, and that exposure to these media is unlikely to result in adverse noncancer health effects for any human receptor. Because groundwater use is not regarded as plausible based on insufficient yield in both the overburden and bedrock units, the risks associated with AP1 groundwater are accordingly implausible. The

naturally poor quality in the AP1 bedrock groundwater further strengthens the implausibility of bedrock groundwater use.

It is noted that the screening level ecological risk assessment for AP1 (Shaw, 2010e) recommends no further investigation or other actions at AP1 based on ecological concerns. Therefore, no further investigation or other actions are recommended at AP1 based on either human health or ecological receptors.

8.0 References

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TABLES

Table 2-1

Summary of Samples Evaluated in the Baseline Human Health Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Location	Sample Number	Sample Type	Sample Date	Depth (ft bgs)	Analyses
SOIL					
Surface Soil					
ASH PIT 1-SB01	AP0001	REG	8-Dec-08	0.5 - 1.5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB02	AP0004	REG	8-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB03	AP0007	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB04	AP0010	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB05	AP0014	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0023	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0063	FD	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB09	AP0026	REG	8-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
PBOW99-SBA101A	PBOW99SBA101A	REG	11-Jun-99	0 - 0.5	Metals, SVOC
PBOW99-SBA101A	PBOW99SBA101A-DUP	FD	11-Jun-99	0 - 0.5	Metals, SVOC
PBOW99-SBA102A	PBOW99SBA102A	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SBA103A	PBOW99SBA103A	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SBA104B	PBOW99SBA104B	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SSA101	PBOW99SSA101	REG	10-Jun-99	0 - 0	Metals, SVOC
Subsurface Soil					
ASH PIT 1-SB01	AP0002	REG	8-Dec-08	3.5 - 5.5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB01	AP0003	REG	8-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB02	AP0005	REG	8-Dec-08	3 - 3.8	Exp, Metals, SVOC
ASH PIT 1-SB02	AP0006	REG	8-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB03	AP0008	REG	9-Dec-08	3 - 5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB03	AP0009	REG	9-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB04	AP0011	REG	9-Dec-08	3 - 4	Exp, Metals, Pest, PCB, SVOC
ASH PIT 1-SB04	AP0012	FD	9-Dec-08	3 - 4	Exp, Metals, Pest, PCB, SVOC
ASH PIT 1-SB04	AP0013	REG	9-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB05	AP0015	REG	9-Dec-08	3 - 3.7	Exp, Metals, PCBs SVOC
ASH PIT 1-SB05	AP0016	REG	9-Dec-08	8 - 9	Exp, Metals, SVOC
ASH PIT 1-SB06	AP0018	REG	8-Dec-08	5 - 5.8	Exp, Metals, PCBs SVOC
ASH PIT 1-SB06	AP0019	REG	8-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB06	AP0017	REG	8-Dec-08	0.8 - 1.8	Exp, Metals, PCBs SVOC

Table 2-1

Summary of Samples Evaluated in the Baseline Human Health Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Location	Sample Number	Sample Type	Sample Date	Depth (ft bgs)	Analyses
ASH PIT 1-SB08	AP0024	REG	9-Dec-08	3 - 5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0025	REG	9-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB09	AP0027	REG	8-Dec-08	3 - 4	Exp, Metals, PCBs SVOC
ASH PIT 1-SB09	AP0028	REG	8-Dec-08	8 - 10	Exp, Metals, SVOC
ASH PIT 1-SB09	AP0058	FD	8-Dec-08	8 - 10	Exp, Metals, SVOC
PBOW99-SBA103B	PBOW99SBA103B	REG	10-Jun-99	1 - 4	Metals, SVOC
SEDIMENT					
AP1-SD01	AP1007	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD02	AP1008	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD03	AP1012	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD04	AP1013	REG	20-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
SURFACE WATER					
AP1-SW01	AP2007	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW02	AP2008	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW03	AP2012	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW04	AP2013	REG	20-May-09	NA	Exp, Metals, PCB, SVOC
GROUNDWATER					
Overburden-Monitoring Well					
AP1-MW01	AP3050	REG	7-May-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-MW01	AP3070	REG	4-Nov-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-MW02	AP3051	REG	10-May-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-MW02	AP3071	REG	6-Nov-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-MW03	AP3052	REG	11-May-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-MW03	AP3072	REG	6-Nov-09	0 - 0	Explosives, Gen Chem, Metals (f & uf), SVOC, VOC
Bedrock					
AP1-BEDGW-001	AP3053	REG	9-May-09	0 - 0	Exp, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-BEDGW-001	AP3073	REG	6-Nov-09	0 - 0	Exp, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-BEDGW-002	AP3054	REG	10-May-09	0 - 0	Exp, Gen Chem, Metals (f & uf), SVOC, VOC
AP1-BEDGW-002	AP3074	REG	10-Nov-09	0 - 0	Exp, Gen Chem, Metals (f & uf), SVOC, VOC

Table 2-1

Summary of Samples Evaluated in the Baseline Human Health Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Location	Sample Number	Sample Type	Sample Date	Depth (ft bgs)	Analyses
Piezometer [a]					
ASH PIT 1-PZ01	AP3000	REG	12-Dec-08	19 - 19	Cyanide, Exp, Gen Chem, Metals (f & uf), SVOC
ASH PIT 1-PZ02	AP3001	REG	11-Dec-08	16 - 16	Cyanide, Exp, Gen Chem, Metals (f & uf), SVOC
ASH PIT 1-PZ04	AP3003	REG	15-Dec-08	20 - 20	Exp, SVOC
ASH PIT 1-PZ04	WW3005	FD	15-Dec-08	20 - 20	Exp, SVOC
ASH PIT 1-PZ05	AP3004	REG	15-Dec-08	20 - 20	Cyanide, Exp, Gen Chem, Metals (f & uf), SVOC

[a] These samples are summarized and screened, but no exposure calculations are presented.

ft bgs - Feet below ground surface.
FD - Field duplicate; averaged with the regular sample at the same location to create one result.
REG - regular sample
Exp - Explosives
f & uf - Metals analysis performed on filtered and unfiltered samples, respectively.
Gen Chem - General Chemistry
Metals - Metals analysis performed on unfiltered samples unless otherwise noted.
PCB - Polychlorinated biphenyls
SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds.

Table 2-2

Background Screening Concentrations of Inorganics in Soil
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits	Statistical Distribution	Arithmetic Mean	95% UTL [a]	Background Screening Criterion [b]
Aluminum	12 / 12	3520 - 15500	NA	L	8.43E+03	2.69E+04	15500
Antimony	9 / 25	5.9 - 9.3	5.4 - 74	NP	4.68E+00	NA	9.30
Arsenic	23 / 26	2.1 - 36.5	1.2 - 3.7	L	1.08E+01	7.10E+01	36.5
Barium	9 / 12	35.6 - 826	23.2 - 24.7	L	1.16E+02	1.30E+03	826
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	NA	L	1.13E+04	2.18E+05	52300
Chromium	25 / 26	4.4 - 29	12.3 - 12.3	NP	1.34E+01	NA	29.0
Cobalt	9 / 12	9.6 - 116	5.8 - 6.2	L	2.26E+01	2.48E+02	116
Copper	23 / 26	2.3 - 56.2	2.2 - 2.9	L	1.70E+01	1.47E+02	56.2
Iron	12 / 12	5880 - 234000	NA	L	4.01E+04	3.58E+05	234000
Lead	26 / 26	1.9 - 48.6	NA	L	1.28E+01	5.13E+01	48.6
Magnesium	12 / 12	629 - 10400	NA	L	3.26E+03	3.08E+04	10400
Manganese	26 / 26	21 - 13300	NA	L	7.29E+02	3.51E+03	3506
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	0.085
Nickel	26 / 26	5.4 - 55.1	NA	L	2.28E+01	7.79E+01	55.1
Potassium	11 / 12	579 - 3390	617 - 617	L	1.24E+03	6.08E+03	3390
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	11.1
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30
Vanadium	11 / 12	9 - 40.9	61.7 - 61.7	L	2.48E+01	8.31E+01	40.9
Zinc	26 / 26	6.6 - 655	NA	L	7.30E+01	3.22E+02	322

mg/kg - Milligrams per kilogram.
NA - Not applicable; not available.

[a] 95% UTL - 95% upper tolerance limit calculated as described in Shaw (2005).

[b] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used.

Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Source: Shaw Environmental, Inc. (Shaw), 2005, 2004 Data Summary and Evaluation Report, Final, Plum Brook Ordnance Works, Sandusky, Ohio, April.

Table 2-3

Background Screening Concentrations of Inorganics in Groundwater Ash Pit 1 Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of Values, µg/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Mean µg/L	Standard Deviation	UTL [a] µg/L	BSC [b] µg/L
Metals - Unfiltered										
Aluminum	11 / 13	85	3.15E+01	3.09E+02	2.00E+02	2.00E+02	1.05E+02	6.98E+01	4.17E+02	309
Arsenic	4 / 26	15	3.30E+00	7.40E+00	1.00E+01	1.00E+01	4.99E+00	6.56E-01	7.92E+00	7.4
Barium	28 / 28	100	2.58E+01	1.18E+04	2.00E+02	2.00E+03	1.73E+03	3.77E+03	1.86E+04	11800
Calcium	28 / 28	100	1.74E+04	3.16E+05	5.00E+03	5.00E+03	1.38E+05	8.31E+04	5.09E+05	316000
Cobalt	6 / 27	22	1.00E+00	1.21E+01	5.00E+01	5.00E+01	2.05E+01	8.75E+00	5.96E+01	12.1
Copper	2 / 28	7	3.30E+00	1.98E+01	2.50E+01	2.50E+01	1.24E+01	2.26E+00	2.25E+01	19.8
Iron	24 / 27	89	3.82E+01	1.55E+03	1.00E+02	1.00E+02	4.15E+02	4.87E+02	2.59E+03	1550
Magnesium	28 / 28	100	7.28E+03	2.17E+05	5.00E+03	5.00E+03	7.17E+04	5.85E+04	3.33E+05	217000
Manganese	28 / 28	100	3.60E+00	6.88E+02	1.50E+01	1.50E+01	8.12E+01	1.24E+02	6.36E+02	636
Nickel	4 / 27	15	4.80E+00	8.60E+00	4.00E+01	4.00E+01	1.81E+01	4.67E+00	3.90E+01	8.6
Potassium	28 / 28	100	2.53E+03	1.16E+05	5.00E+03	5.00E+04	2.70E+04	3.06E+04	1.64E+05	116000
Sodium	28 / 28	100	1.33E+04	1.39E+06	5.00E+03	5.00E+04	3.55E+05	4.36E+05	2.30E+06	1390000
Zinc	14 / 19	74	8.30E-01	5.07E+02	2.00E+01	2.00E+01	5.55E+01	1.23E+02	6.06E+02	507

[a] The UTL (upper tolerance limit) is calculated as described in Shaw (2005).

[b] The BSC (background screening concentration) is the calculated UTL or the maximum detected concentration, whichever is less.

µg/L - Micrograms per liter.

BTEX - Benzene, toluene, ethylbenzene, and xylenes.

Source: Shaw Environmental, Inc. (Shaw), 2005, 2004 Data Summary and Evaluation Report, Final, Plum Brook Ordnance Works, Sandusky, Ohio, April.

Table 2-4

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	13 / 13	100	6.19E+03	J	1.66E+04		3.81E+00	4.89E+01	9.89E+03	1.55E+04	7700		Y	1.13E+04	1.13E+04
Antimony	4 / 13	31	3.47E-01	J	8.38E-01		4.60E-01	2.60E+00	5.98E-01	9.30E+00	3.1		N (b)		---
Arsenic	13 / 13	100	6.40E+00	J	3.12E+01		9.19E-01	2.60E+00	1.25E+01	3.65E+01	0.39		N (b)		---
Barium	13 / 13	100	3.27E+01	J	1.63E+02		1.90E-01	4.89E+01	9.09E+01	8.26E+02	1500		N (b)		---
Beryllium	9 / 13	69	1.50E+00		1.65E+01	J	1.90E-01	1.20E+00	7.31E+00	1.00E+00	16		Y	1.14E+01	1.14E+01
Cadmium	1 / 13	8	2.60E-01	J/U	2.60E-01	J/U	2.60E-01	6.10E-01	2.40E-01	NA	7		N (a)		---
Calcium	13 / 13	100	3.33E+03		5.91E+04		4.76E+00	1.22E+03	1.50E+04	5.23E+04	Nutrient		N (c)		---
Chromium	13 / 13	100	1.05E+01		1.81E+01		4.76E-01	1.30E+00	1.31E+01	2.90E+01	0.29		N (b)		---
Cobalt	12 / 13	92	5.47E+00		2.60E+01		1.90E-01	1.22E+01	8.89E+00	1.16E+02	2.3		N (b)		---
Copper	13 / 13	100	1.35E+01		5.00E+01		4.76E-01	6.10E+00	2.78E+01	5.62E+01	310		N (b)		---
Iron	13 / 13	100	1.72E+04		9.51E+04		3.97E+00	2.62E+01	5.19E+04	2.34E+05	5500		N (b)		---
Lead	13 / 13	100	4.90E+00		2.71E+01		3.90E-01	7.90E-01	9.53E+00	4.86E+01	400		N (b)		---
Magnesium	12 / 13	92	6.51E+02		5.83E+03		1.90E+00	1.22E+03	2.49E+03	1.04E+04	Nutrient		N (c)		---
Manganese	13 / 13	100	1.25E+02		2.81E+03		1.90E-01	3.90E+00	5.71E+02	3.51E+03	180		N (b)		---
Mercury	7 / 13	54	1.46E-02	J	3.83E-01		2.46E-02	2.40E-01	9.34E-02	8.50E-02	2.3		N (a)		---
Nickel	6 / 13	46	3.93E+00	J	7.92E+01		2.86E-01	9.80E+00	1.28E+01	5.51E+01	150		N (a)		---
Potassium	11 / 13	85	5.77E+02	J	1.28E+03		2.38E+01	1.22E+03	8.90E+02	3.39E+03	Nutrient		N (c)		---
Selenium	9 13	69	4.97E-01	J/U	2.70E+00		6.50E-01	1.30E+00	9.49E-01	2.00E+00	39		N (a)		---
Sodium	8 / 13	62	5.76E+01		1.65E+02		9.54E+00	1.22E+03	2.23E+02	NA	Nutrient		N (c)		---
Thallium	4 / 13	31	2.74E-01	JJ	5.63E-01		4.60E-01	2.60E+00	5.63E-01	1.30E+00	0.51	g	N (b)		---
Vanadium	13 / 13	100	1.44E+01		3.92E+01		1.90E-01	1.31E+01	2.48E+01	4.09E+01	39		N (b)		---
Zinc	11 / 13	85	3.48E+01		9.58E+01		2.38E+00	5.20E+00	5.11E+01	3.22E+02	2300		N (b)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	1 / 7	14	1.03E-01	J/U	1.03E-01	JU	2.02E-01	2.69E-01	1.16E-01		0.22		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 13	8	2.79E-01	JJ	2.79E-01	JJ	4.10E-01	2.37E+00	3.25E-01		340	h	N (a)		---
Anthracene	1 / 13	8	2.16E-01	JJ	2.16E-01	JJ	4.10E-01	2.37E+00	3.20E-01		1700		N (a)		---
Benzo(a)anthracene	1 / 13	8	8.56E-01	JJ	8.56E-01	JJ	4.10E-01	2.37E+00	3.69E-01		0.15		Y	7.33E-01	7.33E-01
Benzo(a)pyrene	1 / 13	8	7.21E-01	JJ	7.21E-01	JJ	4.10E-01	2.37E+00	3.59E-01		0.015		Y	7.03E-01	7.03E-01
Benzo(b)fluoranthene	1 / 13	8	1.21E+00	JJ	1.21E+00	JJ	4.10E-01	2.37E+00	3.96E-01		0.15		Y	8.29E-01	8.29E-01
Chrysene	1 / 13	8	8.50E-01	JJ	8.50E-01	JJ	4.10E-01	2.37E+00	3.69E-01		15		N (a)		---
Dibenzofuran	1 / 13	8	7.57E-02	QJ	7.57E-02	QJ	4.10E-01	2.37E+00	3.69E-01		7.8		N (a)		---
Fluoranthene	2 / 13	15	4.77E-02	QJ	1.88E+00	JJ	4.10E-01	2.37E+00	4.35E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 13	8	1.82E+00	JJ	1.82E+00	JJ	4.10E-01	2.37E+00	4.43E-01		0.15		Y	1.03E+00	1.03E+00
Methylnaphthalene, 2-	2 / 13	15	3.63E-01	QJ	9.42E-01	J	4.10E-01	2.37E+00	3.72E-01		31		N (a)		---
Naphthalene	4 / 13	31	6.61E-02	J	7.64E-01	J	4.10E-01	2.37E+00	3.07E-01		3.6		N (a)		---
Phenanthrene	4 / 13	31	5.50E-02	J	8.31E-01	JJ	4.10E-01	2.37E+00	2.75E-01		170	i	N (a)		---
Pyrene	2 / 13	15	3.78E-02	QJ	1.32E+00	JJ	4.10E-01	2.37E+00	3.92E-01		170		N (a)		---

BSC - Background screening concentration.
COPC - Chemical of Potential Concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - milligrams per kilogram.
Q - Data is biased high due to a calibration error.

Table 2-4

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

RBSC - Risk based screening concentration.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas*** , Plum Brook Ordnance Works, Sandusky, Ohio, August.

[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.

[d] Y = Chemical is chosen as COPC.

[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and evelopment, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.

[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.

[g] RBSC based on thallium from IRIS, 2009.

[h] RBSC based on acenapthene.

[i] RBSC based on pyrene.

Table 2-5

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]
Inorganics													
Aluminum	17 / 17	100	2.77E+03		1.30E+04	J	3.31E+00	2.53E+01	8.64E+03	1.55E+04	7700		N (b)
Antimony	8 / 17	47	2.58E-01	J	3.48E-01	J	4.15E-01	1.30E+00	2.79E-01	9.30E+00	3.1		N (a)
Arsenic	17 / 17	100	3.57E+00		1.58E+01		8.31E-01	1.30E+00	7.60E+00	3.65E+01	0.39		N (b)
Barium	17 / 17	100	1.30E+01		4.51E+02		1.65E-01	2.53E+01	8.31E+01	8.26E+02	1500		N (a)
Beryllium	16 / 17	94	3.62E+00	J	1.29E+01	J	1.65E-01	6.30E-01	6.57E+00	1.00E+00	16		N (a)
Cadmium	6 / 17	35	2.69E-01	J	7.66E+00		2.50E-01	5.31E-01	6.83E-01	NA	7		Y
Calcium	17 / 17	100	2.30E+03		5.09E+04		4.46E+00	6.32E+02	3.00E+04	5.23E+04	Nutrient		N (c)
Chromium	17 / 17	100	5.51E+00		2.07E+01		4.13E-01	6.30E-01	1.34E+01	2.90E+01	0.29		N (b)
Cobalt	17 / 17	100	3.23E+00		6.22E+01		1.65E-01	6.30E+00	1.39E+01	1.16E+02	2.3		N (b)
Copper	17 / 17	100	7.71E+00		3.77E+01	J	4.13E-01	3.20E+00	2.50E+01	5.62E+01	310		N (a)
Iron	17 / 17	100	1.06E+04		6.20E+04		3.31E+00	1.96E+01	2.67E+04	2.34E+05	5500		N (b)
Lead	17 / 17	100	5.69E+00		1.92E+01		3.80E-01	5.31E-01	1.14E+01	4.86E+01	400		N (a)
Magnesium	17 / 17	100	8.39E+02		2.01E+04		1.65E+00	6.32E+02	1.07E+04	1.04E+04	Nutrient		N (c)
Manganese	17 / 17	100	2.51E+02		4.47E+03		1.65E-01	1.90E+00	7.50E+02	3.51E+03	180		Y
Mercury	12 / 17	71	1.24E-02	J	5.92E-02		2.07E-02	1.30E-01	2.38E-02	8.50E-02	2.3		N (a)
Nickel	15 / 17	88	1.71E+00		4.43E+01		2.48E-01	5.10E+00	1.71E+01	5.51E+01	150		N (a)
Potassium	17 / 17	100	1.64E+02		1.72E+03		2.07E+01	6.32E+02	1.01E+03	3.39E+03	Nutrient		N (c)
Selenium	3 / 17	18	5.59E-01	J	9.70E-01		6.30E-01	1.06E+00	5.21E-01	2.00E+00	39		N (a)
Sodium	16 / 17	94	2.50E+01		1.53E+02		8.26E+00	6.32E+02	1.13E+02	NA	Nutrient		N (c)
Thallium	11 / 17	65	2.39E-01	J	6.63E-01		4.15E-01	1.30E+00	3.38E-01	1.30E+00	0.51	e	N (b)
Vanadium	17 / 17	100	1.51E+01	J	3.76E+01	J	1.65E-01	6.30E+00	2.23E+01	4.09E+01	39		N (a)
Zinc	17 / 17	100	2.31E+01		9.24E+01		2.07E+00	2.50E+00	6.44E+01	3.22E+02	2300		N (a)
Semivolatile Organic Compounds													
Benzo(a)anthracene	1 / 17	6	6.42E-02	J	6.42E-02	J	3.73E-01	4.68E-01	1.93E-01		0.15		N (a)
Benzo(a)pyrene	1 / 17	6	5.34E-02	J	5.34E-02	J	3.73E-01	4.68E-01	1.93E-01		0.015		Y
Benzo(b)fluoranthene	1 / 17	6	8.29E-02	J	8.29E-02	J	3.73E-01	4.68E-01	1.95E-01		0.15		N (a)
Chrysene	1 / 17	6	6.75E-02	J	6.75E-02	J	3.73E-01	4.68E-01	1.94E-01		15		N (a)
Fluoranthene	1 / 17	6	1.26E-01	J	1.26E-01	J	3.73E-01	4.68E-01	1.97E-01		230		N (a)
Indeno(1,2,3-cd)pyrene	1 / 17	6	3.12E-01	J	3.12E-01	J	3.73E-01	4.68E-01	2.08E-01		0.15		Y
Naphthalene	1 / 17	6	5.53E-02	J	5.53E-02	J	3.73E-01	4.68E-01	1.93E-01		3.6		N (a)
Phenanthrene	2 / 17	12	7.50E-02	J	8.33E-02	JJ	3.73E-01	4.68E-01	1.88E-01		170	f	N (a)
Pyrene	1 / 17	6	1.02E-01	J	1.02E-01	J	3.73E-01	4.68E-01	1.96E-01		170		N (a)

Note: Exposure point concentrations (EPC) are not provided. The subsurface soil and surface soil data sets are combined for all AP1 soil pathways as "total soil" to evaluate soil exposure for future receptors. EPCs for these receptors are based on total soil. See Table 2.6.
BSC - Background screening concentration.
COPC - Chemical of Potential Concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

Table 2-5

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

mg/kg - milligrams per kilogram.
NA - Not available.
RBSC - Risk based screening concentration.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas*** , Plum Brook Ordnance Works, Sandusky, Ohio, August.

[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.

[d] Y = Chemical is chosen as COPC.

[e] RBSC based on thallium from EPA, 2009, Integrated Risk Information System (IRIS), on line.

[f] RBSC based on pyrene.

Table 2-6

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	30 / 30	100	2.77E+03		1.66E+04		3.31E+00	4.89E+01	9.18E+03	1.55E+04	7700		Y	1.00E+04	1.00E+04
Antimony	12 / 30	40	2.58E-01	J	8.38E-01		4.15E-01	2.60E+00	4.18E-01	9.30E+00	3.1		N (b)		---
Arsenic	30 / 30	100	3.57E+00		3.12E+01		8.31E-01	2.60E+00	9.71E+00	3.65E+01	0.39		N (b)		---
Barium	30 / 30	100	1.30E+01		4.51E+02		1.65E-01	4.89E+01	8.65E+01	8.26E+02	1500		N (b)		---
Beryllium	25 / 30	83	1.50E+00		1.65E+01	J	1.65E-01	1.20E+00	6.89E+00	1.00E+00	16		Y	8.52E+00	8.52E+00
Cadmium	7 / 30	23	2.60E-01	J/U	7.66E+00		2.50E-01	6.10E-01	4.91E-01	NA	7		Y	1.26E+00	1.26E+00
Calcium	30 / 30	100	2.30E+03		5.91E+04		4.46E+00	1.22E+03	2.35E+04	5.23E+04	Nutrient		N (c)		---
Chromium	30 / 30	100	5.51E+00		2.07E+01		4.13E-01	1.30E+00	1.33E+01	2.90E+01	0.29		N (b)		---
Cobalt	29 / 30	97	3.23E+00		6.22E+01		1.65E-01	1.22E+01	1.17E+01	1.16E+02	2.3		N (b)		---
Copper	30 / 30	100	7.71E+00		5.00E+01		4.13E-01	6.10E+00	2.62E+01	5.62E+01	310		N (b)		---
Iron	30 / 30	100	1.06E+04		9.51E+04		3.31E+00	2.62E+01	3.76E+04	2.34E+05	5500		N (b)		---
Lead	30 / 30	100	4.90E+00		2.71E+01		3.80E-01	7.90E-01	1.06E+01	4.86E+01	400		N (b)		---
Magnesium	29 / 30	97	6.51E+02		2.01E+04		1.65E+00	1.22E+03	7.12E+03	1.04E+04	Nutrient		N (c)		---
Manganese	30 / 30	100	1.25E+02		4.47E+03		1.65E-01	3.90E+00	6.72E+02	3.51E+03	180		Y	1.37E+03	1.37E+03
Mercury	19 / 30	63	1.24E-02	J	3.83E-01		2.07E-02	2.40E-01	5.40E-02	8.50E-02	2.3		N (a)		---
Nickel	21 / 30	70	1.71E+00		7.92E+01		2.48E-01	9.80E+00	1.52E+01	5.51E+01	150		N (a)		---
Potassium	28 / 30	93	1.64E+02		1.72E+03		2.07E+01	1.22E+03	9.59E+02	3.39E+03	Nutrient		N (c)		---
Selenium	12 / 30	40	4.97E-01	J/U	2.70E+00		6.30E-01	1.30E+00	7.06E-01	2.00E+00	39		N (a)		---
Sodium	24 / 30	80	2.50E+01		1.65E+02		8.26E+00	1.22E+03	1.61E+02	NA	Nutrient		N (c)		---
Thallium	15 / 30	50	2.39E-01	J	6.63E-01		4.15E-01	2.60E+00	4.35E-01	1.30E+00	0.51	g	N (b)		---
Vanadium	30 / 30	100	1.44E+01		3.92E+01		1.65E-01	1.31E+01	2.34E+01	4.09E+01	39		N (b)		---
Zinc	28 / 30	93	2.31E+01		9.58E+01		2.07E+00	5.20E+00	5.87E+01	3.22E+02	2300		N (b)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	1 / 13	8	1.03E-01	J/U	1.03E-01	J/U	4.00E-02	2.69E-01	1.04E-01		0.22		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 30	3	2.79E-01	JJ	2.79E-01	JJ	3.73E-01	2.37E+00	2.56E-01		340	h	N (a)		---
Anthracene	1 / 30	3	2.16E-01	JJ	2.16E-01	JJ	3.73E-01	2.37E+00	2.54E-01		1700		N (a)		---
Benzo(a)anthracene	2 / 30	7	6.42E-02	J	8.56E-01	JJ	3.73E-01	2.37E+00	2.70E-01		0.15		Y	2.57E-01	2.57E-01
Benzo(a)pyrene	2 / 30	7	5.34E-02	J	7.21E-01	JJ	3.73E-01	2.37E+00	2.65E-01		0.015		Y	2.16E-01	2.16E-01
Benzo(b)fluoranthene	2 / 30	7	8.29E-02	J	1.21E+00	JJ	3.73E-01	2.37E+00	2.82E-01		0.15		Y	3.47E-01	3.47E-01
Chrysene	2 / 30	7	6.75E-02	J	8.50E-01	JJ	3.73E-01	2.37E+00	2.69E-01		15		N (a)		---
Dibenzofuran	1 / 30	3	7.57E-02	QJ	7.57E-02	QJ	3.73E-01	2.37E+00	2.75E-01		7.8		N (a)		---
Fluoranthene	3 / 30	10	4.77E-02	QJ	1.88E+00	JJ	3.73E-01	2.37E+00	3.00E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	2 / 30	7	3.12E-01	J	1.82E+00	JJ	3.73E-01	2.37E+00	3.10E-01		0.15		Y	4.46E-01	4.46E-01
Methylnaphthalene, 2-	2 / 30	7	3.63E-01	QJ	9.42E-01	J	3.73E-01	2.37E+00	2.76E-01		31		N (a)		---
Naphthalene	5 / 30	17	5.53E-02	J	7.64E-01	J	3.73E-01	2.37E+00	2.43E-01		3.6		N (a)		---
Phenanthrene	6 / 30	20	5.50E-02	J	8.31E-01	JJ	3.73E-01	2.37E+00	2.26E-01		170	i	N (a)		---
Pyrene	3 / 30	10	3.78E-02	QJ	1.32E+00	JJ	3.73E-01	2.37E+00	2.81E-01		170		N (a)		---

BSC - Background screening concentration.
COPC - Chemical of Potential Concern
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - milligrams per kilogram
Q - Data is biased high due to a calibration error
RBSC - Risk based screening concentration
VQ - Validation qualifier.

Table 2-6

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas*** , Plum Brook Ordnance Works, Sandusky, Ohio, August.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on thallium from EPA, 2009, Integrated Risk Information System (IRIS), on line.
[h] RBSC based on acenapthene.
[i] RBSC based on pyrene.

Table 2-7

Statistical Summary and Selection of Chemicals of Potential Concern in Bedrock Groundwater
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

(Page 1 of 2)

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	BSC [a] µg/L	RBSC [b] µg/L	COPC? [c,d]	EPC [e] µg/L
Inorganics - Unfiltered													
Aluminum	4 / 4	100	4.53E+01	J	6.75E+01	J	2.00E+02	2.00E+02	5.42E+01	3.09E+02	3700	N (a)	---
Antimony	1 / 4	25	5.80E+00	J	5.80E+00	J	6.00E+00	1.20E+01	4.45E+00	NA	1.5	Y	5.80E+00
Arsenic	4 / 4	100	5.07E+01		1.10E+02		1.00E+01	2.00E+01	8.29E+01	7.40E+00	0.045	Y	1.10E+02
Barium	4 / 4	100	4.34E+02		9.89E+02		2.00E+02	2.00E+02	7.19E+02	1.18E+04	730	N (b)	---
Calcium	4 / 4	100	2.20E+05		5.90E+05		1.00E+03	2.00E+03	4.07E+05	3.16E+05	Nutrient	N (c)	---
Iron	4 / 4	100	3.22E+02		4.91E+03		3.00E+02	3.00E+02	1.78E+03	1.55E+03	2600	Y	4.91E+03
Magnesium	4 / 4	100	1.55E+05		4.79E+05		5.00E+03	5.00E+03	3.02E+05	2.17E+05	Nutrient	N (c)	---
Manganese	4 / 4	100	3.80E+01		8.57E+02		1.50E+01	1.50E+01	5.37E+02	6.36E+02	88	Y	8.57E+02
Nickel	2 / 4	50	2.80E+00	J	5.80E+00	J	4.00E+01	4.00E+01	1.22E+01	8.60E+00	73	N (a)	---
Potassium	4 / 4	100	5.96E+04		1.29E+05		1.00E+04	2.00E+04	9.69E+04	1.16E+05	Nutrient	N (c)	---
Selenium	3 / 4	75	5.20E+00	J	1.19E+01	J	1.00E+01	2.00E+01	8.35E+00	NA	18	N (a)	---
Sodium	4 / 4	100	5.73E+05		1.47E+06		1.00E+05	5.00E+05	1.06E+06	1.39E+06	Nutrient	N (c)	---
Thallium	1 / 4	25	5.30E+00	J	5.30E+00	J	1.00E+01	1.00E+01	5.08E+00	NA	0.24	Y	5.30E+00
Vanadium	3 / 4	75	1.30E+00	J	2.60E+00	J	5.00E+01	5.00E+01	7.78E+00	NA	18	N (a)	---
Zinc	3 / 3	100	7.70E+00	J	1.60E+01	J	2.00E+01	2.00E+01	1.17E+01	5.01E+02	1100	N (a)	---
Semivolatile Organic Compounds													
3-Methylphenol and 4-Methylphenol	3 / 4	75	9.70E-01	J	9.00E+00	J	4.80E+00	2.00E+01	5.09E+00		93	N (a)	---
Dimethylphenol, 2,4-	4 / 4	100	2.00E+00	J	2.47E+01		4.80E+00	2.00E+01	1.26E+01		73	N (a)	---
Methylnaphthalene, 2-	4 / 4	100	1.45E+01		3.62E+01		4.80E+00	2.00E+01	2.45E+01		15	Y	3.62E+01
Methylphenol, 2-	2 / 4	50	6.20E+00	J	6.90E+00	J	4.80E+00	2.00E+01	4.49E+00		180	N (a)	---
Naphthalene	4 / 4	100	1.18E+01		3.32E+01		4.80E+00	2.00E+01	2.33E+01		0.14	Y	3.32E+01
Phenol	2 / 4	50	6.60E+00	J	6.60E+00	J	4.80E+00	2.00E+01	4.51E+00		1100	N (a)	---
Volatile Organic Compounds													
Acetone	2 / 2	100	1.40E+02	J	4.63E+02	J	2.50E+02	5.00E+02	3.02E+02		2200	N (a)	---
Benzene	4 / 4	100	2.75E+01		1.30E+03		2.00E+00	2.00E+01	5.02E+02		0.41	Y	1.30E+03
Butanone, 2-	3 / 4	75	1.09E+01		2.99E+02		1.00E+01	1.00E+02	9.66E+01		710	N (a)	---
Carbon disulfide	3 / 4	75	1.90E+00	J	1.23E+01	J	4.00E+00	4.00E+01	9.30E+00		100	N (a)	---
Chloroform	2 / 4	50	1.20E+01		1.80E+01		2.00E+00	2.00E+01	1.03E+01		0.19	Y	1.80E+01
Chloromethane	1 / 4	25	2.16E+02		2.16E+02		4.00E+00	4.00E+01	6.20E+01		19	Y	2.16E+02
Ethylbenzene	4 / 4	100	3.09E+01		1.76E+02		2.00E+00	2.00E+01	9.46E+01		1.5	Y	1.76E+02
Methylene chloride	1 / 2	50	2.88E+01	J	2.88E+01	J	1.00E+01	1.00E+02	1.69E+01		4.8	Y	2.88E+01
Tetrachloroethane, 1,1,2,2-	1 / 4	25	5.30E-01	J	5.30E-01	J	2.00E+00	2.00E+01	4.13E+00		0.067	Y	5.30E-01
Toluene	4 / 4	100	4.36E+01		7.30E+02		2.00E+00	2.00E+01	3.33E+02		230	Y	7.30E+02
Xylenes, total	4 / 4	100	3.70E+02		1.34E+03		6.00E+00	6.00E+01	8.11E+02		20	Y	1.34E+03
General Chemistry													
Chloride	4 / 4	100	7.05E+05		4.28E+06		1.00E+05	2.00E+05	2.46E+06		Nutrient	N (c)	---
Cyanide, total	2 / 4	50	3.70E+01	J	1.20E+02	J	1.00E+01	1.00E+01	4.18E+01		73	Y	1.20E+02
Nitrate-Nitrite	2 / 4	50	4.60E+01	J	1.90E+02	J	1.00E+02	2.00E+03	5.59E+02		1,000 [f]	N (a)	---
Sulfate	2 / 4	50	1.36E+04		9.34E+04		2.00E+03	1.00E+05	4.55E+04		250,000 [g]	N (a)	---

Table 2-7

Statistical Summary and Selection of Chemicals of Potential Concern in Bedrock Groundwater
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

BSC - Background screening concentration.
RBSC - Risk based screening concentration.
COPC - Chemical of Potential Concern.
µg/L - micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Shaw Environmental, Inc. (Shaw), 2005b, 2004 Groundwater Data Summary and Evaluation Report, Final, Former Plum Brook Ordnance Works, Sandusky, Ohio, April.

[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.

[d] Y = Chemical is chosen as COPC.

[e] Exposure point concentration (EPC) used in risk assessment equal to maximum detected concentration.

[f] RBSC for nitrite is used for screening.

[g] EPA, 2009, ***2009 Edition of the Drinking Water Standards and Health Advisories*** , Office of Water, October, EPA 822-R-09-011.

Table 2-8

Statistical Summary and Selection of Chemicals of Potential Concern in Monitoring Well Overburden Groundwater
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	BSC [a] µg/L	RBSC [b] µg/L		COPC? [c,d]	95% UCL [e] µg/L	EPC [f] µg/L
Inorganics-Unfiltered															
Aluminum	6 / 6	100	1.72E+01	J	1.11E+03	J	2.00E+02	2.00E+02	2.48E+02	3.09E+02	3700		N (a)		---
Arsenic	2 / 6	33	5.40E+00	J	6.30E+00	J	1.00E+01	1.00E+01	5.28E+00	7.40E+00	0.045		N (b)		---
Barium	6 / 6	100	2.86E+01	J	2.52E+02		2.00E+02	2.00E+02	9.78E+01	1.18E+04	730		N (a)		---
Calcium	6 / 6	100	9.34E+04		2.82E+05		1.00E+03	1.00E+03	1.73E+05	3.16E+05	Nutrient		N (c)		---
Cobalt	6 / 6	100	1.00E+00	J	2.22E+01	J	5.00E+01	5.00E+01	6.55E+00	1.21E+01	1.1		Y	1.85E+01	1.85E+01
Iron	3 / 6	50	1.09E+03		4.61E+03		3.00E+02	3.00E+02	1.76E+03	1.55E+03	2600		Y	3.86E+03	3.86E+03
Lead	2 / 3	67	2.20E+00	J	4.30E+00	J	5.00E+00	1.00E+01	3.83E+00	NA	15	g	N (a)		---
Magnesium	6 / 6	100	3.87E+04		9.24E+04		5.00E+03	5.00E+03	6.42E+04	2.17E+05	Nutrient		N (c)		---
Manganese	6 / 6	100	1.36E+02		3.23E+04		1.50E+01	1.50E+02	7.00E+03	6.36E+02	88		Y	9.58E+04	3.23E+04
Nickel	6 / 6	100	4.10E+00		1.52E+01	J	4.00E+01	4.00E+01	8.42E+00	8.60E+00	73		N (a)		---
Potassium	6 / 6	100	2.82E+03	J	2.82E+04		1.00E+04	1.00E+04	1.66E+04	1.16E+05	Nutrient		N (c)		---
Selenium	4 / 6	67	3.70E+00	J	5.20E+00	J	1.00E+01	2.00E+01	5.58E+00	NA	18		N (a)		---
Sodium	6 / 6	100	1.89E+04		8.13E+04		1.00E+04	2.00E+04	5.39E+04	1.39E+06	Nutrient		N (c)		---
Thallium	1 / 6	17	3.46E+01		3.46E+01		1.00E+01	2.00E+01	9.93E+00	NA	0.24		Y	3.14E+01	3.14E+01
Vanadium	2 / 6	33	1.20E+00	J	2.90E+00	J	5.00E+01	5.00E+01	1.74E+01	NA	18		N (a)		---
Zinc	3 / 4	75	1.34E+01	J	2.32E+01		2.00E+01	2.00E+01	1.52E+01	5.01E+02	1100		N (a)		---
Nitroaromatics															
Nitrotoluene, 2-	1 / 6	17	1.80E-01	J	1.80E-01	J	1.90E-01	2.00E-01	1.11E-01		0.31		N (a)		---
Nitrotoluene, 4-	1 / 6	17	1.70E-01	J	1.70E-01	J	1.90E-01	2.00E-01	1.09E-01		4.2		N (a)		---
Volatile Organic Compounds															
Chloroform	1 / 6	17	4.80E-01	J	4.80E-01	J	1.00E+00	1.00E+00	4.97E-01		0.19		Y	5.03E-01	4.80E-01
General Chemistry															
Chloride	6 / 6	100	1.15E+04		4.00E+04		2.00E+03	1.00E+04	3.14E+04		Nutrient		N (c)		---
Nitrate-Nitrite	3 / 6	50	4.10E+01	J	1.30E+02	J	1.00E+02	2.00E+03	3.79E+02		1,000	h	N (a)		---
Sulfate	6 / 6	100	1.09E+05		5.89E+05		4.00E+03	2.00E+05	3.47E+05		250,000	i	Y	5.20E+05	5.20E+05

BSC - Background screening concentration.
RBSC - Risk based screening concentration.
COPC - Chemical of Potential Concern.
µg/L - micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Shaw Environmental, Inc. (Shaw), 2005b, 2004 Groundwater Data Summary and Evaluation Report, Final, Former Plum Brook Ordnance Works, Sandusky, Ohio, April.
[b] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = maximum detected concentration does not exceed the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (EPA, 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, Georgia, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] Screening criteria for lead based on the action level of 15 µg/L (EPA, 1996, *Drinking Water Regulations and Health Advisories* , Office of Water, Washington, DC, October).
[h] Screening criteria for nitrite.
[i] EPA, 2009, ***2009 Edition of the Drinking Water Standards and Health Advisories*** , Office of Water, October, EPA 822-R-09-011.

Table 2-9

Statistical Summary and Selection of Chemicals of Potential Concern in Sediment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	RBSC [a] mg/kg	COPC? [b,c]	EPC [d] mg/kg
Inorganics												
Aluminum	4 / 4	100	4.49E+03		9.88E+03		1.30E+01	2.40E+01	7.84E+03	7.70E+04	N (a)	---
Antimony	3 / 4	75	5.00E-01	J	1.30E+00	J	3.80E+00	7.30E+00	1.19E+00	3.10E+01	N (a)	---
Arsenic	4 / 4	100	4.00E+00		1.59E+01		5.10E-01	9.70E-01	9.20E+00	3.90E-01	Y	1.59E+01
Barium	4 / 4	100	3.13E+01		1.10E+02		1.30E+01	2.40E+01	5.86E+01	1.50E+04	N (a)	---
Beryllium	4 / 4	100	3.00E-01	J	1.60E+00		3.20E-01	6.10E-01	7.55E-01	1.60E+02	N (a)	---
Cadmium	4 / 4	100	2.30E-01	J	5.90E-01		2.50E-01	4.80E-01	4.23E-01	7.00E+01	N (a)	---
Calcium	4 / 4	100	1.04E+04		2.99E+04		3.20E+02	6.10E+02	1.77E+04	Nutrient	N (b)	---
Chromium	4 / 4	100	7.80E+00		1.69E+01		6.40E-01	1.20E+00	1.30E+01	2.90E-01	Y	1.69E+01
Cobalt	4 / 4	100	4.40E+00		9.90E+00		3.20E+00	6.10E+00	8.08E+00	2.30E+01	N (a)	---
Copper	4 / 4	100	1.05E+01		3.85E+01		1.60E+00	3.00E+00	2.27E+01	3.10E+03	N (a)	---
Iron	4 / 4	100	9.27E+03		2.17E+04		6.40E+00	1.20E+01	1.79E+04	5.50E+04	N (a)	---
Lead	4 / 4	100	7.00E+00	J	2.37E+01		6.40E+00	1.20E+01	1.67E+01	4.00E+02	N (a)	---
Magnesium	4 / 4	100	1.81E+03		9.37E+03		3.20E+02	6.10E+02	5.13E+03	Nutrient	N (b)	---
Manganese	4 / 4	100	1.65E+02		1.67E+03		1.10E+00	9.10E+00	6.55E+02	1.80E+03	N (a)	---
Mercury	4 / 4	100	2.10E-02	J	1.40E-01		1.00E-01	2.00E-01	7.38E-02	2.30E+01	N (a)	---
Nickel	4 / 4	100	1.20E+01		2.67E+01		2.50E+00	4.80E+00	2.14E+01	1.50E+03	N (a)	---
Potassium	4 / 4	100	7.25E+02	J	1.74E+03		6.40E+02	1.20E+03	1.24E+03	Nutrient	N (b)	---
Selenium	3 / 4	75	3.20E-01	J	1.30E+00	J	6.40E+00	1.20E+01	1.44E+00	3.90E+02	N (a)	---
Silver	1 / 4	25	9.90E-02	J	9.90E-02	J	6.40E-01	1.20E+00	3.49E-01	3.90E+02	N (a)	---
Sodium	2 / 4	50	8.31E+01	J	1.12E+02	J	6.40E+02	1.20E+03	2.79E+02	Nutrient	N (b)	---
Vanadium	4 / 4	100	1.24E+01		2.55E+01		3.20E+00	6.10E+00	1.98E+01	3.90E+02	N (a)	---
Zinc	4 / 4	100	3.33E+01		1.37E+02		1.30E+00	2.40E+00	7.86E+01	2.30E+04	N (a)	---
Polychlorinated Biphenyls												
Aroclor 1254	2 / 4	50	2.50E-02	J	3.52E-02	J	2.20E-02	4.10E-02	2.11E-02	1.10E-01	N (a)	---
Aroclor 1260	2 / 4	50	2.07E-02	J	1.13E-01	J	2.20E-02	4.10E-02	3.94E-02	2.20E-01	N (a)	---
Semivolatiles Organic Compounds												
Benzo(a)anthracene	1 / 4	25	1.21E-01	J	1.21E-01	J	2.20E-01	1.10E+00	2.28E-01	1.50E-01	N (a)	---
Benzo(a)pyrene	1 / 4	25	1.12E-01	J	1.12E-01	J	2.20E-01	1.10E+00	2.26E-01	1.50E-02	Y	1.12E-01
Benzo(b)fluoranthene	1 / 4	25	1.75E-01	J	1.75E-01	J	2.20E-01	1.10E+00	2.41E-01	1.50E-01	Y	1.75E-01
Chrysene	1 / 4	25	1.49E-01	J	1.49E-01	J	2.20E-01	1.10E+00	2.35E-01	1.50E+01	N (a)	---
Dibenzofuran	1 / 4	25	1.50E-01	J	1.50E-01	J	2.20E-01	1.10E+00	2.35E-01	7.80E+01	N (a)	---
Di-n-butyl phthalate	1 / 4	25	1.80E-01	J	1.80E-01	J	4.30E-01	2.20E+00	4.90E-01	6.10E+03	N (a)	---
Fluoranthene	1 / 4	25	1.91E-01	J	1.91E-01	J	2.20E-01	1.10E+00	2.45E-01	2.30E+03	N (a)	---
Methylnaphthalene, 2-	1 / 4	25	6.16E-01		6.16E-01		2.20E-01	1.10E+00	3.52E-01	3.10E+02	N (a)	---
Naphthalene	1 / 4	25	3.37E-01	J	3.37E-01	J	2.20E-01	1.10E+00	2.82E-01	3.60E+00	N (a)	---
Phenanthrene	1 / 4	25	3.06E-01	J	3.06E-01	J	2.20E-01	1.10E+00	2.74E-01	1.70E+02 [e]	N (a)	---
Pyrene	1 / 4	25	1.95E-01	J	1.95E-01	J	2.20E-01	1.10E+00	2.46E-01	1.70E+02	N (a)	---

Table 2-9

Statistical Summary and Selection of Chemicals of Potential Concern in Sediment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

RBSC - Risk based screening concentration
COPC - Chemical of Potential Concern
mg/kg - milligrams per kilogram.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) residential soil and are based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = essential nutrient.
[c] Y = Chemical is chosen as COPC.
[d] Exposure point concentration (EPC) used in risk assessment equal to maximum detected concentration.
[e] RBSC based on pyrene.

Table 2-10

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Water
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Conc Minimum	VQ	Detected Conc Maximum	VQ	Reporting Limits Minimum	Reporting Limits Maximum	Arithmetic Mean µg/L	RBSC [a] µg/L		COPC? [b,c]
Metals												
Aluminum	4 / 4	100	31.8	J	8770		200	200	2.23E+03	3.70E+04		N (a)
Arsenic	1 / 4	25	8.3	J	8.3	J	10	10	5.83E+00	4.50E-02		Y
Barium	4 / 4	100	31.9	J	80	J	200	200	4.56E+01	7.30E+03		N (a)
Calcium	4 / 4	100	139000		222000		1000	1000	1.62E+05	Nutrient		N (b)
Chromium	1 / 4	25	13.9		13.9		10	10	7.23E+00	4.30E-02		Y
Cobalt	1 / 4	25	6.9	J	6.9	J	50	50	2.05E+01	1.10E+01		N (a)
Copper	1 / 4	25	19.2	J	19.2	J	25	25	1.42E+01	1.50E+03		N (a)
Iron	3 / 4	75	26.6	J	15100		300	300	3.83E+03	2.60E+04		N (a)
Lead	3 / 4	75	2	J	15		10	10	6.03E+00	1.50E+01	d	N (a)
Magnesium	4 / 4	100	26200		36900		5000	5000	2.90E+04	Nutrient		N (b)
Manganese	4 / 4	100	247		836		15	15	4.92E+02	8.80E+02		N (a)
Nickel	1 / 4	25	26.2	J	26.2	J	40	40	2.16E+01	7.30E+02		N (a)
Potassium	4 / 4	100	2030	J	11800		10000	10000	4.51E+03	Nutrient		N (b)
Sodium	4 / 4	100	6400	J	9140	J	10000	10000	7.36E+03	Nutrient		N (b)
Vanadium	1 / 4	25	20	J	20	J	50	50	2.38E+01	1.80E+02		N (a)
Zinc	4 / 4	100	9.6	J	93.2		20	20	3.17E+01	1.10E+04		N (a)

RBSC - Risk based screening concentration.
COPC - Chemical of Potential Concern.
µg/L - micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-Based Screening Concentrations based on U.S. Environmental Protection Agency (EPA) Regional Screening Level Table (May 2010) tap water values are based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration does not exceed the RBSC.
(b) = essential nutrient.
[c] Y = Chemical is chosen as COPC.
[d] Screening criteria for lead based on the action level of 15 µg/L (EPA, 2009, *Drinking Water Regulations and Health Advisories* , Office of Water, Washington, DC, October, EPA 822-R-09-011).

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Groundskeeper – Current			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation[a]
Subsurface Soil	Not Quantified[b]		
Groundwater	Not Quantified[c]		
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Groundskeeper – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Indoor Worker – Future[c]			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact[a]
	Dust Emissions; Volatilization	Indoor Air	Inhalation[a]
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Construction Worker – Current/Future			
Total Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	Not Quantified[b]		
Surface Water	None	Surface Water	Dermal Contact
	Volatilization from Water	Ambient Air	Inhalation[a]
Sediment	None	Sediment	Incidental Ingestion
			Dermal Contact
On-Site Resident – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Wind Erosion	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
	Volatilization from Water	Indoor Air	Inhalation
Surface Water	None	Surface Water	Dermal Contact
	Volatilization from Water	Ambient Air	Inhalation[a]
Sediment	None	Sediment	Incidental Ingestion
			Dermal Contact

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Hunter – Current/Future			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions, Volatilization	Ambient Air	Inhalation[a]
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[e]		
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Hunter's Child – Current/Future			
Surface Soil	Not Quantified[e]		
	Not Quantified[e]		
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[e]		
Surface Water	Not Quantified[e]		
Sediment	Not Quantified[e]		

[a] Although theoretically complete, this pathway is not quantified as explained in text.

[b] Although contact with this medium is possible, exposure would be sporadic, rather than continuous or predictable. Such exposures do not lend themselves to evaluation under the chronic toxicity paradigm used in a baseline risk assessment.

[c] Even though the mixing of surface and subsurface soil described in footnote "d" might otherwise be applicable, this receptor was selected primarily to evaluate exposure to indoor air resulting from subsurface soil contamination. Surface soil was used for direct contact exposure to avoid potential "double counting" of contaminants in subsurface soil (refer to Section 3.1.3.2 of text).

[d] Total soil represents a mixture of surface and subsurface soil. This is assumed for future scenarios where excavation and regrading is assumed to take place.

[e] There is no plausible pathway for exposure.

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
General Variables Used in All Intake Models					
Body weight (BW), kg	70[a]	70[a]	Child: 15[a] Adult: 70[a]	70[a]	Child: 15[a] Adult: 70[a]
Averaging time, noncancer (AT), days[b]	9125	183	Child: 2190 Adult: 8760	9125	Child: 2190 Adult: 10950
Averaging time, cancer (AT), days[b]	25550	25550	25550	25550	25550
Inhalation of VOCs and Resuspended Dust from Surface Soil, Total Soil or Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	1[c]	1[c]	1[c]	NA	NA
Inhalation rate (IR_a), m^3/day	20[d]	20[d]	Child: 10[e] Adult: 20[d]	NA	NA
Exposure frequency (EF), days/year	250[d]	250[f]	350[a]	NA	NA
Exposure duration (ED), years	25[a]	0.5[f]	Child: 6[a] Adult: 24[a]	NA	NA
Inhalation of VOCs in Indoor Air from Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	NA	NA	1[c]	1[c]	NA
Inhalation rate (IR_a), m^3/day	NA	NA	Child: 10[e] Adult: 20[d]	20[d]	NA
Exposure frequency (EF), days/year	NA	NA	350[a]	250[a]	NA
Exposure duration (ED), years	NA	NA	Child: 6[a] Adult: 24[a]	25[a]	NA
Incidental Ingestion of Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	0.9[g]	1[c]	1[c]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Soil incidental ingestion rate (IR_{so}), mg/day	100[a]	330[a]	Child: 200[a] Adult: 100[a]	50[a]	Child: NA Adult: 100[a]
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	250[a]	14[d]
Exposure duration (ED), years	25[a]	0.5[f]	Child: 6[a] Adult: 24[a]	25[a]	30[a]
Dermal Contact with Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	1[c]	NA	1[c]
Body surface area exposed to soil (SA_{so}), cm^2	3,300[h]	3,300[h]	Child: 2,800[h] Adult: 5,700[h]	NA	Child: NA Adult: 3,300[h,i]
Soil-to-skin adherence factor (AF_{so}), mg/cm^2	0.2[h]	0.3[h]	Child: 0.2[h] Adult: 0.07[h]	NA	0.2[h,i]
Dermal absorption factor (ABS), unitless	csv	csv	csv	NA	csv
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	NA	14[i]
Exposure duration (ED), years	25[a]	0.5[f]	Child: 6[a] Adult: 24[a]	NA	30[a]
Inhalation of VOCs from Groundwater					
Exposure time (ET), hours/day	NA	NA	24[j]	NA	NA
Inhalation rate (IR_a), m^3/hour	NA	NA	Child: 0.416[e] Adult: 0.833[e]	NA	NA
Exposure frequency (EF), days/year	250[d]	NA	350[a]	250[a]	NA

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Drinking Water Ingestion of Groundwater					
Fraction exposed to contaminated medium (Fl_{gw}), unitless	1[c]	NA	1[c]	1[c]	NA
Drinking water ingestion rate (IR_{gw}), L/day	1[d]	NA	Child: 1[e] Adult: 2[d]	1[d]	NA
Exposure frequency (EF), days/year	250[d]	NA	350[a]	250[a]	NA
Dermal Contact with Groundwater					
Fraction exposed to contaminated medium (Fl_{gw}), unitless	1[c]	NA	1[c]	1[c]	NA
Body surface area exposed to water (SA_{gw}), cm^2	3,300[h,k]	NA	Child: 6,600[l] Adult: 20,000[l]	3,300[l]	NA
Permeability coefficient (PC), cm/hour	csv	NA	csv	csv	NA
Exposure time (ET_{gw}), hours/day	1[c]	NA	Child: 0.333[l] Adult: 0.2[l]	1[c]	NA
Exposure frequency (EF), days/year	250[d]	NA	350[d]	250[a]	NA
Incidental Ingestion of Sediment					
Fraction exposed to contaminated medium (Fl_{sd}), unitless	NA	1[c]	0.1[g]	NA	NA
Sediment incidental ingestion rate (IR_{sd}), mg/day	NA	330[a]	Child: 200[a] Adult: 100[a]	NA	NA
Exposure frequency (EF), days/year	NA	250[f]	350[a]	NA	NA
Exposure duration (ED), years	NA	0.5[f]	Child: 6[a] Adult: 24[a]	NA	NA

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Dermal Contact with Sediment					
Fraction exposed to contaminated medium (FI_{sd}), unitless	NA	1[f]	0.1[g]	NA	NA
Body surface area exposed to sediment (SA_{sd}), cm^2	NA	3,300[h]	Child: 2,800[h] Adult: 5,700[h]	NA	NA
Sediment-to-skin adherence factor (AF_{sd}), mg/cm^2	NA	0.3[h]	Child: 0.2[h] Adult: 0.07[h]	NA	NA
Dermal absorption factor (ABS), unitless	NA	csv	csv	NA	NA
Exposure frequency (EF), days/year	NA	250[f]	52[m]	NA	NA
Exposure duration (ED), years	NA	0.5[f]	Child: 6[a] Adult: 24[a]	NA	NA
Dermal Contact with Surface Water					
Body surface area exposed to surface water (SA_{sw}), cm^2	NA	3,300[n]	Child: 2,800[n] Adult: 7,000[o]	NA	NA
Permeability coefficient (PC), cm/hour	NA	csv	csv	NA	NA
Exposure time (ET_{sw}), hour/day	NA	4[f]	3[m]	NA	NA
Exposure frequency (EF), days/year	NA	250[f]	52[m]	NA	NA
Exposure duration (ED), years	NA	0.5[f]	Child: 6[a] Adult: 24[a]	NA	NA
Venison Consumption					
Venison ingestion rate (IR_v), kg/day	NA	NA	NA	NA	Child: 0.005[i] Adult: 0.013[p]
Exposure frequency (EF), days/year	NA	NA	NA	NA	350[a]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Exposure duration (ED), years	NA	NA	NA	NA	Child: 6[a] Adult: 30[q]

Note: Groundwater pathways are quantified only for Ash Pit 1 because no groundwater samples could be collected at Ash Pit 3 (see Section 2.1 of text).

[a] U.S. Environmental Protection Agency (EPA), 2002, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Office of Solid Waste and Emergency Response, Washington, DC, 9355.4-24, December.

[b] For noncancer evaluation, calculated as the product of ED (years) x 365 days/year; for cancer evaluation, calculated as the product of 70 years (assumed human lifetime) x 365 days/year. Source: U.S. Environmental Protection Agency (EPA), 1989a, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

[c] Default value which assumes 100 percent of exposure is to contaminated medium.

[d] U.S. Environmental Protection Agency (EPA), 1991, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.603.

[e] U.S. Environmental Protection Agency (EPA), 2004a, *User's Guide and Background Technical Document for Region 9 Preliminary Remediation Goals (PRG) Table*, Region 9, San Francisco, California, October, <http://www.epa.gov/region09/waste/sfund /prg/files/04usersguide.pdf>.

[f] Assumed; see Section 3.1.3.4 of text for explanation.

[g] It is assumed that on days when the resident is visiting the ditches and is exposed to sediment that half of the daily exposure via dermal contact and ingestion are associated with ditch sediment (sediment FI=0.5) and half of the exposure is associated with soil (soil FI=0.5). The resident is assumed to be exposed to soil 350 days/year and to sediment 52 days/year. The FI values of 0.1 for sediment and 0.9 for soil are weighted average daily values as described in Section 3.1.3.4 of the text.

[h] U.S. Environmental Protection Agency (EPA), 2004b, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)*, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

[i] Please see Section 3.1.3.7 of text for detailed explanation.

[j] The *Exposure Factors Handbook* (see reference h) indicates that the 90th percentile for the amount of time spent at a residence is more than 23 hours per day.

[k] Please see Section 3.1.3.2 of text for detailed explanation.

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

[l] U.S. Environmental Protection Agency (EPA), 1997, *Exposure Factors Handbook*, Final, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.
[m] Assumed; please see Section 3.1.3.5 of text for detailed explanation.
[n] Value for dermal soil exposure (EPA, 2004b) was selected as appropriate for exposure to this medium by this receptor; refer to Section 3.1.3.5 of text for detail.
[o] Value based on the Exposure Factors Handbook (EPA, 1997). See Section 3.1.3.5 of the text for detailed explanation.
[p] Please see Section 3.1.3.5 of the text for detailed explanation.
[q] Assumes deer are hunted for a 30-year duration.

csv – Chemical-specific value.
NA – Pathway not applicable for receptor.

Table 3-3

Physical Properties of Site-Related Chemicals[a]
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical of Potential Concern	Soil-to-forage Biotransfer Factor B_p (unitless)	Biotransfer Factor for Beef B_b (days/kg)	Biotransfer Factor for Venison B_v (unitless)	Diffusivity In Air (D_i) (cm^2/second)	Soil Organic Carbon-Water Partition Coefficient K_{oc} (cm^3/g)	log K_{ow}	Absorption Fraction ABS (unitless)	Permeability Coefficient K_p (cm/hour)	*tau* (hour/event)	*t** (hour)	Fraction Absorbed from Water FA (unitless)	B (unitless)	Molecular Weight (g/mole)	Henry's Law Constant (atm-m^3/mole)
Metals														
Aluminum	NA	NA	NA	NA	1.50E+03	NA	NA	NA	NA	NA	NA	NA	26.98	NA
Antimony	NA	NA	NA	NA	4.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	121.75	NA
Arsenic	NA	NA	NA	NA	2.90E+01	NA	0.03	1.00E-03	NA	NA	NA	NA	74.92	NA
Beryllium	NA	NA	NA	NA	7.90E+02	NA	NA	1.00E-03	NA	NA	NA	NA	9.01	NA
Cadmium	6.20E-02	1.20E-04	7.20E-07	NA	7.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	112.41	NA
Chromium III	NA	NA	NA	NA	1.80E+06	NA	NA	1.00E-03	NA	NA	NA	NA	52	NA
Chromium VI	NA	NA	NA	NA	1.90E+01	NA	NA	2.00E-03	NA	NA	NA	NA	52	NA
Chromium, Total	NA	NA	NA	NA	NA	NA	NA	1.00E-03	NA	NA	NA	NA	52	NA
Cobalt	NA	NA	NA	NA	4.50E+01	NA	NA	4.00E-04	NA	NA	NA	NA	58.93	NA
Iron	NA	NA	NA	NA	2.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	55.845	NA
Manganese	NA	NA	NA	NA	6.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	54.94	NA
Thallium	4.00E-04	4.00E-02	2.40E-04	NA	7.10E+01	NA	NA	1.00E-03	NA	NA	NA	NA	204.38	NA
Semivolatile Organic Compounds														
Benzo(a)anthracene	NA	NA	NA	5.10E-02	3.98E+05	5.66E+00	0.13	4.70E-01	2.03	8.53	1	2.8	228.3	3.34E-06
Benzo(a)pyrene	NA	NA	NA	4.30E-02	1.02E+06	6.10E+00	0.13	7.00E-01	2.69	11.67	1	4.3	252.3	4.57E-07
Benzo(b)fluoranthene	NA	NA	NA	2.26E-02	1.23E+06	6.12E+00	0.13	7.00E-01	2.77	12.03	1	4.3	252.3	6.57E-07
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.90E-02	3.47E+06	6.58E+00	0.13	1.00E+00	3.78	16.83	0.6	6.7	276.3	1.60E-06
Methylnaphthalene, 2-	NA	NA	NA	6.97E-02	3.98E+03	3.86E+00	0.13	8.94E-02	0.657	1.58	1	0.41	142.2	5.18E-04
Naphthalene	NA	NA	NA	5.90E-02	2.00E+03	3.30E+00	0.13	4.70E-02	0.56	1.34	1	0.2	128.2	4.40E-04
Volatile Organic Compounds														
Benzene	NA	NA	NA	8.80E-02	5.89E+01	2.13E+00	NA	1.50E-02	0.29	0.7	1	0.1	78.1	5.55E-03
Chloroform	NA	NA	NA	1.04E-01	3.98E+01	1.97E+00	NA	6.80E-03	0.5	1.19	1	0	119.4	3.67E-03
Chloromethane (Methyl Chloride)	NA	NA	NA	1.39E-01	1.41E+01	9.10E-01	NA	3.30E-03	0.2	0.49	1	0	50.5	8.82E-03
Ethylbenzene	NA	NA	NA	7.50E-02	3.63E+02	3.15E+00	NA	4.90E-02	0.42	1.01	1	0.2	106.2	7.88E-03
Methylene chloride	NA	NA	NA	1.01E-01	1.17E+01	1.25E+00	NA	3.50E-03	0.32	0.76	1	0	84.9	3.25E-03
Tetrachloroethane, 1,1,2,2-	NA	NA	NA	7.10E-02	9.33E+01	2.39E+00	NA	6.90E-03	0.93	2.24	1	0	167.9	3.67E-04
Toluene	NA	NA	NA	8.70E-02	1.82E+02	2.73E+00	NA	3.10E-02	0.35	0.84	1	0.1	92.1	6.64E-03
Xylenes	NA	NA	NA	7.00E-02	4.07E+02	3.20E+00	NA	5.30E-02	0.42	1.01	1	0.2	106.2	5.18E-03
General Chemistry														
Cyanide, total	NA	NA	NA	NA	2.84E+00	NA	NA	1.00E-03	NA	NA	NA	NA	26.02	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

tau - Lag time associated with rate at which chemical crosses stratum corneum per event.
t* - Time for absorption across the stratum corneum to reach steady state ; equals 2.4 times tau.
B - Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis
kg - kilogram
g - gram
atm-m^3 - atmospheres per cubic meter

[a] See Appendix C which provides references for these values.

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical of Potential Concern	GAF	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Unit Risk (µg/m^3) $^{-1}$	Inhalation Slope Factor (mg/kg-day) $^{-1}$
Metals							
Aluminum	NA	D	NA	NA	NA	NA	NA
Antimony	0.15	D	NA	NA	NA	NA	NA
Arsenic	1	A	1.50E+00	1.50E+00	A	4.30E-03	1.50E+01
Beryllium	0.007	D	NA	NA	B1	2.40E-03	8.40E+00
Cadmium	0.025	0	NA	NA	B1	1.80E-03	6.30E+00
Chromium III	0.013	D	NA	NA	D	NA	NA
Chromium VI	0.025	D	NA	NA	A	1.20E-02	4.20E+01
Chromium, Total	0.013	D	NA	NA	A	1.20E-02	4.20E+01
Cobalt	1	ND	NA	NA	B	9.00E-04	3.20E+01
Iron	1	ND	NA	NA	ND	NA	NA
Manganese	0.04	D	NA	NA	D	NA	NA
Thallium	1	D	NA	NA	D	NA	NA
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Benzo(a)pyrene	1	B2	7.30E+00	7.30E+00	B2	8.80E-04	3.10E+00
Benzo(b)fluoranthene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Indeno(1,2,3-cd)pyrene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Methylnaphthalene, 2-	1	D	NA	NA	D	NA	NA
Naphthalene	1	C	ND	NA	C	3.40E-05	1.20E-01
Volatile Organic Compounds							
Benzene	1	A	5.50E-02	5.50E-02	A	7.80E-06	2.70E-02
Chloroform	1	B2	NC	NA	B2	ND	NC
Chloromethane (Methyl Chloride)	1	D	NA	NA	D	NA	NA
Ethylbenzene	1	D	NA	NA	D	NA	NA
Methylene chloride	1	B2	7.50E-03	7.50E-03	B2	4.70E-07	1.60E-03
Tetrachloroethane, 1,1,2,2-	1	C	2.00E-01	2.00E-01	C	ND	NA
Toluene	1	D	NA	NA	D	NA	NA
Xylenes	1	D	NA	NA	D	NA	NA
General Chemistry							
Cyanide, total	1	D	NA	NA	D	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

mg/kg-day = milligram per kilogram - day
µg/m^3 - milligram per cubic meter
GAF - gastrointestinal absorption factor
NA - not available or not applicable
ND - no data or not determined
NC - Noncancer value is regarded as protective of cancer effects in the Integrated Risk Information System (IRIS) evaluation (EPA, 2010).
[a] See Appendix C which provides references for these values.

Weight of Evidence (WOE) EPA Group:
A - Carcinogenic to humans
B - Likely to be carcinogenic to humans (includes both the former B1 and B2 probable human carcinogens as classified on IRIS)
C - Suggested evidence of carcinogenic potential
D - Inadequate evidence to assess carcinogenic potential

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

		Oral		Dermal	Reference	Inhalation	
Chemical of Potential Concern	GAF	Reference Dose mg/kg-day	Target Organs	Reference Dose mg/kg-day	Concentration mg/m^3	Reference Dose mg/kg-day	Target Organs
Metals							
Aluminum	NA	1.00E+00	CNS	NA	5.00E-03	1.40E-03	CNS
Antimony	0.15	4.00E-04	Heart	6.00E-05	NA	NA	NA
Arsenic	1	3.00E-04	S	3.00E-04	NA	NA	NA
Beryllium	0.007	2.00E-03	GI	1.40E-05	2.00E-02	5.70E-06	RT
Cadmium	0.025	1.00E-03	K	2.50E-05	1.00E-05	2.90E-06	K
Chromium III	0.013	1.50E+00	ND	2.00E-02	NA	NA	NA
Chromium VI	0.025	3.00E-03	ND	7.50E-05	1.00E-04	2.90E-05	Lung
Chromium, Total	0.013	2.10E-02	ND	2.70E-04	7.00E-04	2.03E-04	Lung
Cobalt	1	3.00E-04	Thyroid	3.00E-04	6.00E-06	1.70E-06	RT
Iron	1	7.00E-01	GI	NA	ND	NA	NA
Manganese	0.04	4.70E-02	CNS	1.90E-03	5.00E-05	1.40E-05	CNS
Thallium	1	6.50E-05	S,L	6.50E-05	ND	NA	NA
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	ND	NA	NA	ND	NA	NA
Benzo(a)pyrene	1	ND	NA	NA	ND	NA	NA
Benzo(b)fluoranthene	1	ND	NA	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	1	ND	NA	NA	ND	NA	NA
Methylnaphthalene, 2-	1	4.00E-03	RT	4.00E-03	ND	NA	NA
Naphthalene	1	2.00E-02	RB/OW	2.00E-02	3.00E-03	8.60E-04	RT
Volatile Organic Compounds							
Benzene	1	4.00E-03	IS	4.00E-03	3.00E-03	8.60E-03	BC
Chloroform	1	1.00E-02	L	1.00E-02	5.00E-02	1.40E-02	L,K
Chloromethane (Methyl Chloride)	1	ND	NA	NA	9.00E-02	2.60E-02	CNS
Ethylbenzene	1	1.00E-01	L,K	1.00E-01	1.00E+00	2.90E-01	F
Methylene chloride	1	6.00E-02	L	6.00E-02	1.00E+00	3.00E-01	NA
Tetrachloroethane, 1,1,2,2-	1	5.00E-02	L	5.00E-02	ND	NA	NA
Toluene	1	8.00E-02	K	8.00E-02	5.00E+00	1.40E+00	NA
Xylenes	1	2.00E-01	RB/OW, Su	2.00E-01	1.00E-01	2.90E-02	CNS
General Chemistry							
Cyanide, total	1	2.00E-02	BW/Thyroid/NS	2.00E-02	3.00E-03	8.60E-04	CNS,Thyroid
Sulfate	NA	NA	NA	NA	NA	NA	NA

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

mg/kg-day = milligram per kilogram - day
mg/m^3 - milligram per cubic meter
GAF - gastrointestinal absorption factor
NA - not available or not applicable
ND - no data
NC - Noncancer value is regarded as protective of cancer effects in the Integrated Risk Information System (IRIS) evaluation (EPA, 2010).
[a] See Appendix C which provides references for these values.

Target Organs: BC - blood cells; S - skin; GI - gastrointestinal; CNS - central nervous system; L - liver; F - fetus; NE - nasal epithelium; NS - nervous system; IS - immune system; RB/OW - reduced body/organ weight; SU - reduced survival; RT - respiratory tract.

Table 5-1

Summary of Risk for All Receptors
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

	Groundskeeper [a]		Construction Worker		Indoor Worker		Resident			Hunter		Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Bedrock Groundwater Use													
Exposure Media													
Surface Soil	5.25E-06	0.21	NE	NE	1.23E-06	0.008	NE	NE	NE	3.07E-07	0.0009	NA	NA
Total Soil	2.08E-06	2.1	1.15E-07	7.5	NE	NE	4.83E-06	0.11	0.6	NE	NE	NE	NE
Groundwater	8.48E-04	9	NE	NE	8.48E-04	9	6.48E-03	58	134	NE	NE	NE	NE
Sediment	NE	NE	6.30E-07	0.2	NE	NE	3.94E-06	0.007	0.07	NE	NE	NE	NE
Surface Water	NE	NE	1.15E-08	0.01	NE	NE	2.68E-07	0.003	0.006	NE	NE	NE	NE
Total ILCR or HI	**9.E-04**	**11**	**8.E-07**	**7.7**	**8.E-04**	**9**	**6.E-03**	**58**	**135**	**3.E-07**	**0.0009**	**NA**	**NA**
Overburden Groundwater Use													
Exposure Media													
Surface Soil	5.25E-06	0.21	NE	NE	1.23E-06	0.008	NE	NE	NE	3.07E-07	0.0009	NA	NA
Total Soil	2.08E-06	2.1	1.15E-07	7.5	NE	NE	4.83E-06	0.11	0.6	NE	NE	NE	NE
Groundwater	NA	12.7	NE	NE	NA	12.7	NA	35	82	NE	NE	NE	NE
Sediment	NE	NE	6.30E-07	0.2	NE	NE	3.94E-06	0.01	0.1	NE	NE	NE	NE
Surface Water	NE	NE	1.15E-08	0.0	NE	NE	2.68E-07	0.00	0.0	NE	NE	NE	NE
Total ILCR or HI	**2.E-06**	**15**	**8.E-07**	**7.7**	**1.E-06**	**12.7**	**9.E-06**	**35**	**82**	**3.E-07**	**0.0009**	**NA**	**NA**

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.

Note:
[a]Total ILCR and total HI values for the groundskeeper reflect the respective totals for the future groundskeeper assumed to use either bedrock or overburden groundwater. The total ILCR and HI values for the current groundskeeper are simply those shown for soil. The rounded current groundskeeper ILCR is 5E-6 and the rounded HI is 0.2.

Table 5-2

Summary of Risk for Receptors Excluding Exposure to Groundwater
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

	Future Groundskeeper		Indoor Worker		Resident		
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI
Exposure Media							
Surface Soil	5.25E-06	0.21	1.23E-06	0.008	NE	NE	NE
Total Soil	2.08E-06	2.14	NE	NE	4.83E-06	0.11	0.65
Sediment	NE	NE	NE	NE	3.94E-06	0.007	0.07
Surface Water	NE	NE	NE	NE	2.68E-07	0.003	0.006
Total ILCR or HI	**2.E-06**	**2**	**1.E-06**	**0.008**	**9.E-06**	**0.1**	**0.7**

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.

Notes:
1. The above receptors are those which were evaluated for groundwater exposure as shown in Table 5-1.
2. Groundwater use is not regarded as plausible because of low yield in the overburden and bedrock units and naturally poor quality in the bedrock unit.

FIGURES

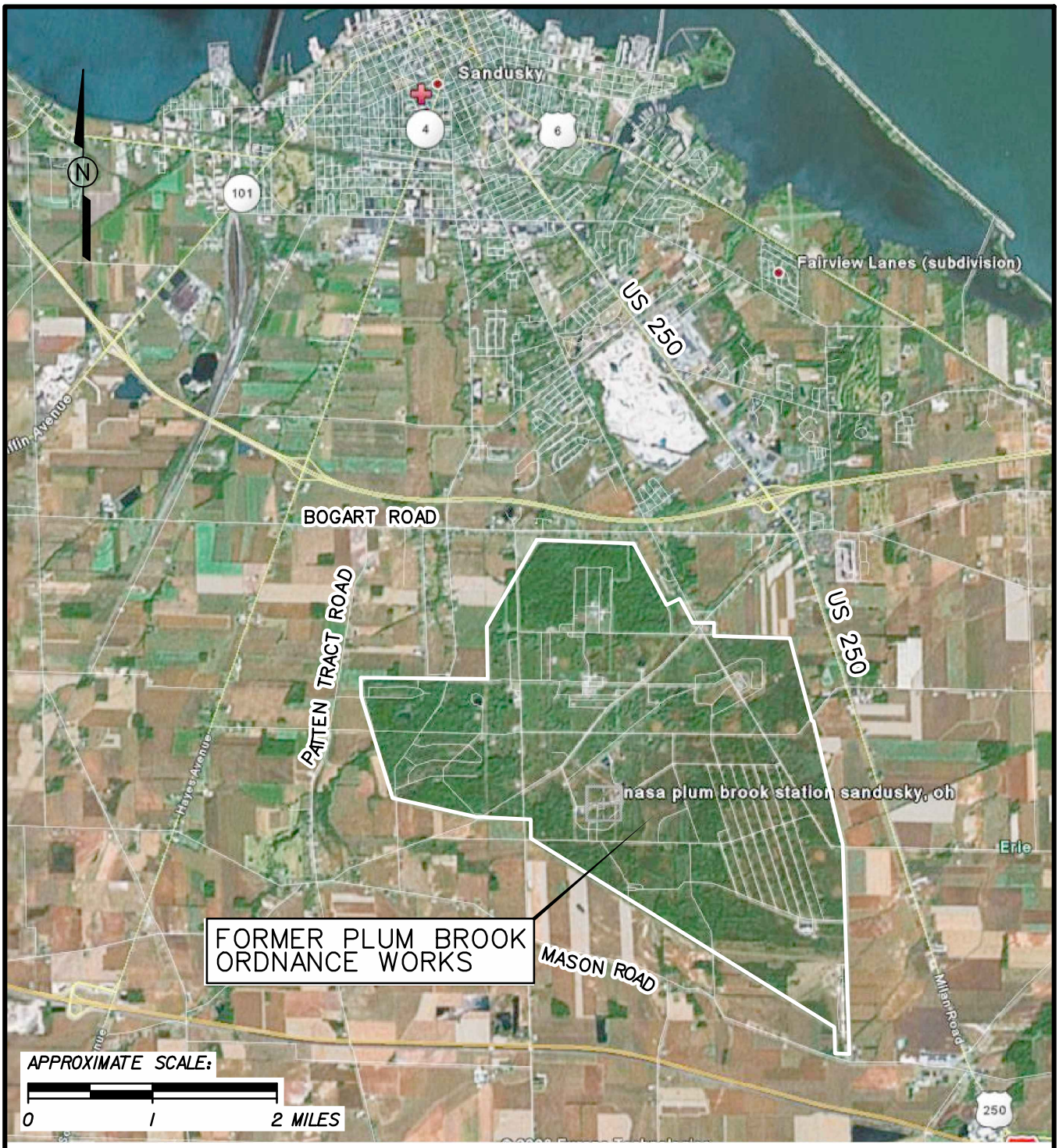

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 1 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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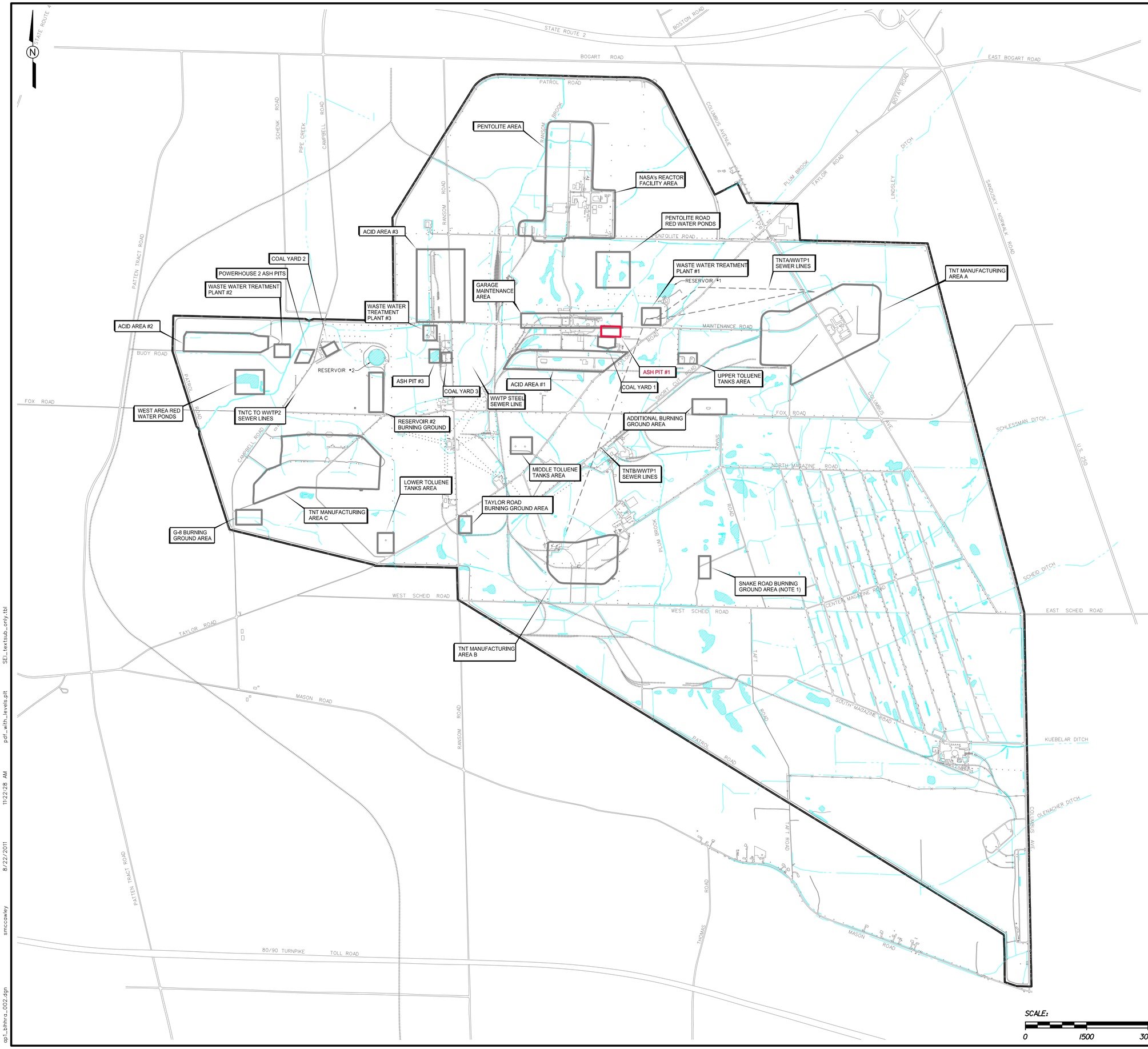

LEGEND:

- AREA OF CONCERN
- POND
- CREEK, DITCH, CONVEYANCE
- RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

FIGURE 1-2
LOCATION OF ASH PIT 1
AT PBOW

ASH PIT 1 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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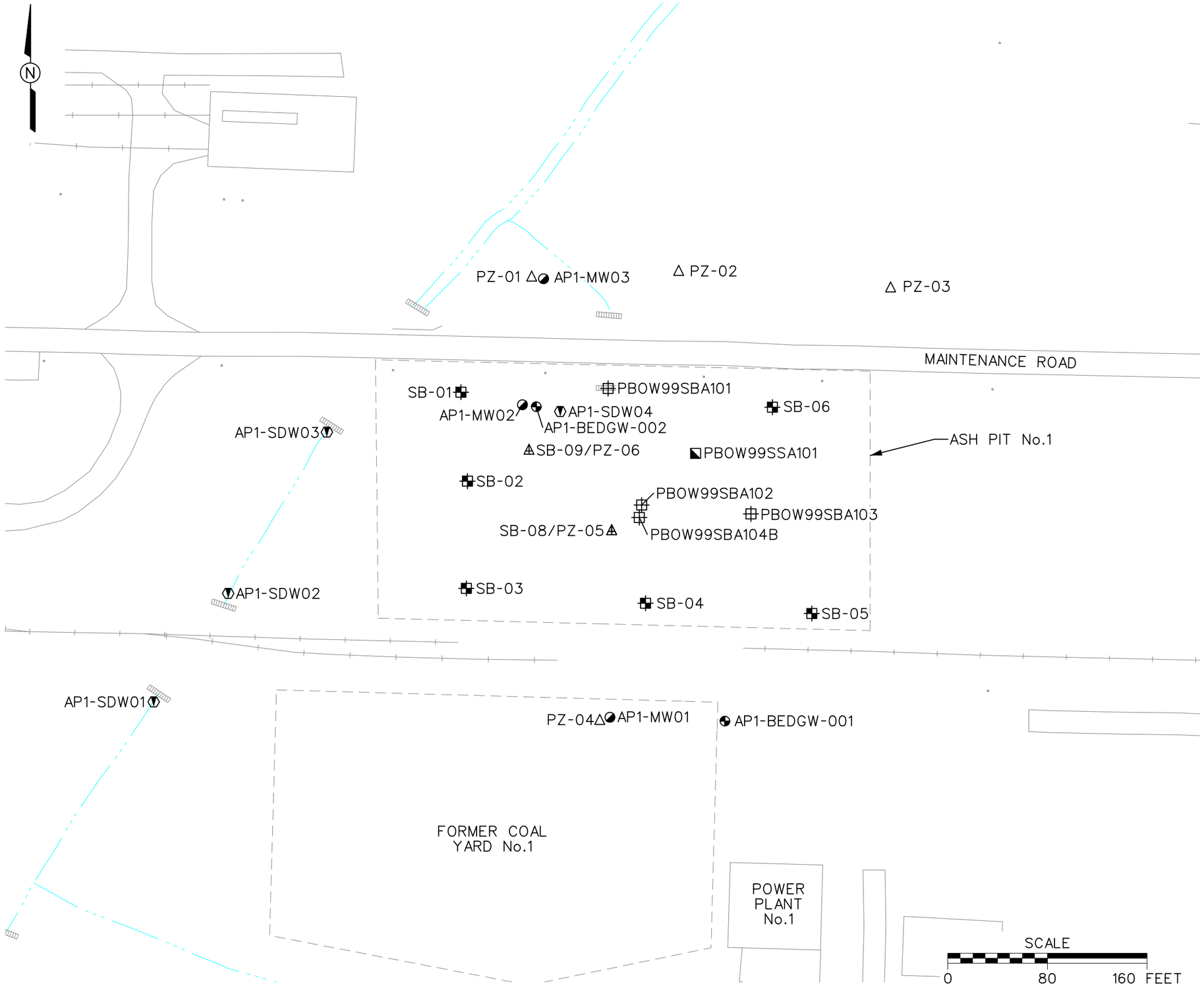


LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- SOIL BORING/PIEZOMETER
- PIEZOMETER
- SURFACE WATER/SEDIMENT SAMPLE
- SI SOIL BORING (USACE, 2000)
- SI SURFACE SOIL SAMPLE (USACE, 2000)
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

NOTES:

1. SITE INVESTIGATION (SI) SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).
2. SAMPLES OTHER THAN THE SI SAMPLES WERE COLLECTED IN 2008 AND 2009 AS PART OF THE REMEDIAL INVESTIGATION.
3. NO BORING LABELED SB-07 WAS DRILLED.

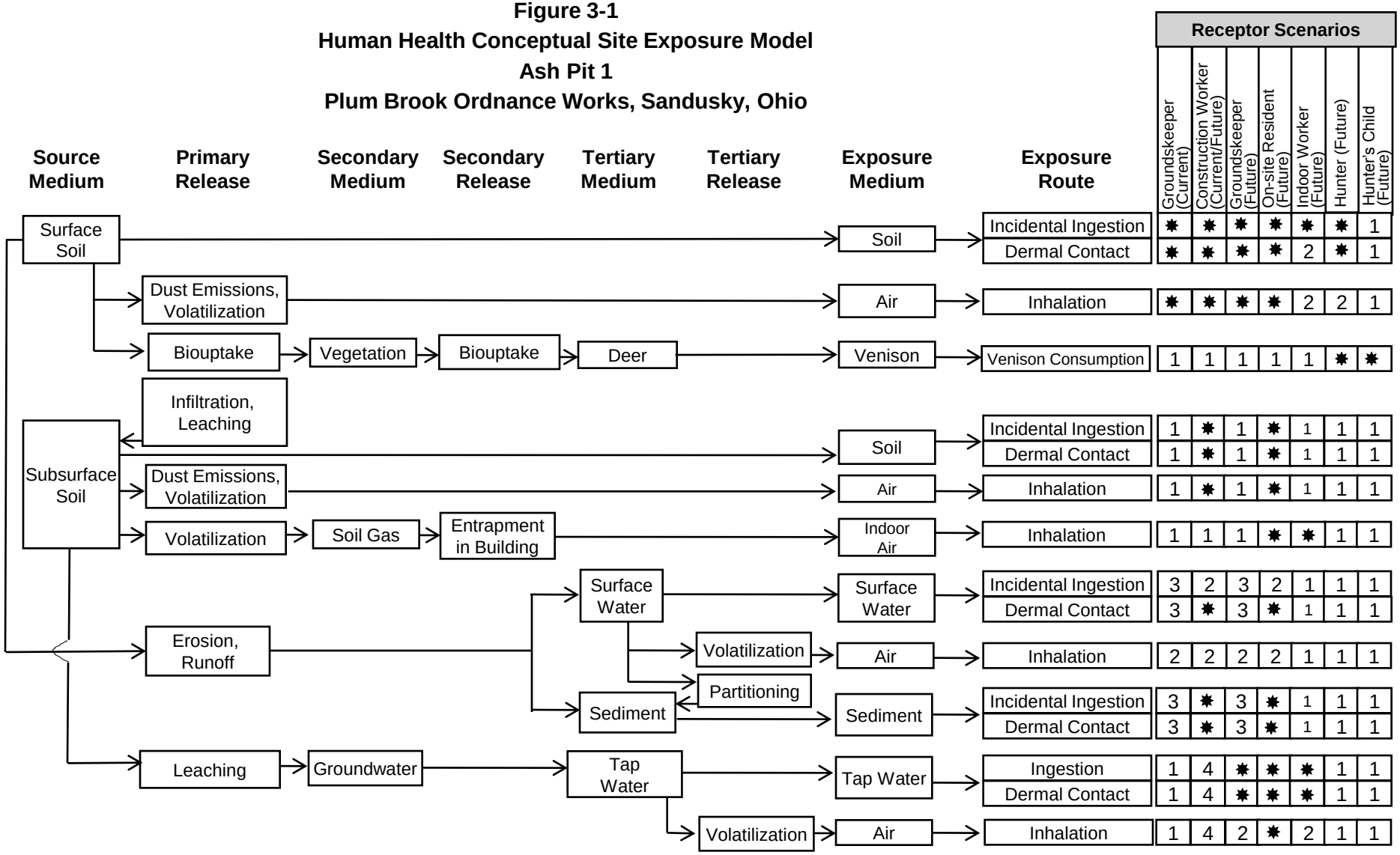
FIGURE 2-1
ASH PIT 1 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 1 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

ap1_blhhra_003.dgn smccawley 8/22/2011 11:01:49 AM pdf_with_levels.plt SEL_textsub_only.tbl

Figure 3-1
Human Health Conceptual Site Exposure Model
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio



✸ = Complete exposure route quantified in the risk assessment.
1 = There is no plausible pathway for exposure to this medium.
2 = Although theoretically complete, this pathway is not quantified as explained in text.
3 = Contact with this medium, although plausible, is not part of this receptor's normal or expected activities; therefore contact would be sporadic and is not quantified.
4 = For current use there is no plausible exposure pathway. For future use, the pathway is potentially complete, but is not quantified as explained in the text.

APPENDIX A

DATA SUMMARY OF CHEMICALS DETECTED IN OVERBURDEN GROUNDWATER PIEZOMETERS

Table A-1

Summary and Screening of Chemicals Detected in Groundwater Overburden Piezometer
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	RBSC [a] µg/L		Exceeds RBSCs? [b,c]
Inorganics - Unfiltered												
Aluminum	3 / 3	100	2.08E+03		9.74E+03		8.89E+01	8.89E+01	5.20E+03	3.70E+03		Y
Barium	2 / 2	100	7.29E+01		9.01E+01		4.44E+00	4.44E+00	8.15E+01	7.30E+02		N
Calcium	3 / 3	100	1.18E+05		1.59E+05		1.11E+02	1.11E+02	1.34E+05	Nutrient		N
Chromium	1 / 3	33	1.12E+01		1.12E+01		1.11E+01	1.11E+01	7.43E+00	4.30E-02		Y
Cobalt	1 / 3	33	2.91E+00	J	2.91E+00	J	4.44E+00	4.44E+00	2.45E+00	1.10E+00		Y
Copper	2 / 3	67	8.60E+00	J	8.93E+00	J	1.11E+01	1.11E+01	7.69E+00	1.50E+02		N
Iron	3 / 3	100	2.58E+03		7.03E+03		8.89E+01	8.89E+01	4.34E+03	2.60E+03		Y
Lead	1 / 3	33	3.20E+00	J	3.20E+00	J	2.78E+00	5.56E+00	2.46E+00	1.50E+01	d	N
Magnesium	3 / 3	100	3.30E+04		5.27E+04		4.44E+01	4.44E+01	4.00E+04	Nutrient		N
Manganese	3 / 3	100	7.14E+01		3.37E+03		4.44E+00	4.44E+00	1.25E+03	8.80E+01		Y
Nickel	2 / 3	67	4.07E+00	J	4.51E+00	J	6.67E+00	6.67E+00	3.97E+00	7.30E+01		N
Potassium	3 / 3	100	1.68E+03		9.13E+03		5.56E+02	5.56E+02	5.03E+03	Nutrient		N
Sodium	2 / 2	100	9.74E+03		1.15E+04		4.44E+02	4.44E+02	1.06E+04	Nutrient		N
Vanadium	3 / 3	100	4.24E+00	J	1.94E+01		4.44E+00	4.44E+00	1.06E+01	1.80E+01		Y
Inorganics - Filtered												
Barium	2 / 2	100	3.05E+01		3.71E+01		4.44E+00	4.44E+00	3.38E+01	7.30E+02		N
Calcium	3 / 3	100	1.01E+05		1.75E+05		1.11E+02	1.11E+02	1.36E+05	Nutrient		N
Lead	1 / 3	33	1.04E+01		1.04E+01		2.78E+00	5.56E+00	4.86E+00	1.50E+01	d	N
Magnesium	3 / 3	100	2.71E+04		5.66E+04		4.44E+01	4.44E+01	3.90E+04	Nutrient		N
Manganese	3 / 3	100	1.07E+01		3.54E+03		4.44E+00	4.44E+00	1.20E+03	8.80E+01		Y
Potassium	3 / 3	100	6.57E+02		9.27E+03		5.56E+02	5.56E+02	3.61E+03	Nutrient		N
Sodium	2 / 2	100	1.11E+04		1.20E+04		2.22E+02	2.22E+02	1.16E+04	Nutrient		N
Thallium	1 / 3	33	5.08E+00	J	5.08E+00	J	2.78E+00	5.56E+00	3.08E+00	2.40E-01		Y
Explosives												
Amino-2,6-dinitrotoluene, 4-	1 / 4	25	3.42E-01	J	3.42E-01	J	3.73E-01	6.45E-01	2.81E-01	7.30E+00		N
General Chemistry												
Chloride	2 / 2	100	3.56E+03		1.21E+04		2.50E+02	2.50E+02	7.83E+03	Nutrient		N
Nitrate-Nitrite	3 / 3	100	3.50E+01	J	3.53E+02		4.00E+01	4.00E+01	1.62E+02	3.70E+02	e	N
Sulfate	2 / 2	100	3.94E+04		6.17E+04		5.00E+02	5.00E+02	5.06E+04	2.50E+05	f	N

RBSC - Risk based screening concentration.
µg/L - micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated co

[a] Risk-Based Screening Concentrations based on USEPA Regional Screening Level Table (May 2010) tap water values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[b] N = Chemical concentration does not exceed the RBSC or is an essential nutrient.
[c] Y = Chemical concentration exceeds the RBSC, or no RBSC is available.
[d] Screening criteria for lead based on the action level of 15 µg/L (US Environmental Protection Agency [EPA],2006, 2006 Edition of the Drinking Water Standards and He Advisories, Office of Water, August,EPA 822-R-06-013, Washington, DC, October).
[e] Screening criterion for nitrite.
[f] Secondary Driking Water Regulations (EPA, 2006).

APPENDIX B

ProUCL OUTPUT FOR UPPER CONFIDENCE LIMITS ON THE MEAN

Input for ProUCL
Ash Pit 1 Surface Soil

		Aluminum	D_Aluminum	Beryllium	D_Beryllium	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Indeno(1,2,3-cd)pyrene
ASH PIT 1-SB01	AP0001	6190	1	5.74	1	0.205	0.205	0.205	0.205
ASH PIT 1-SB02	AP0004	9360	1	10.8	1	0.245	0.245	0.245	0.245
ASH PIT 1-SB03	AP0007	9940	1	13.9	1	0.2425	0.2425	0.2425	0.2425
ASH PIT 1-SB04	AP0010	12700	1	16.5	1	0.229	0.229	0.229	0.229
ASH PIT 1-SB05	AP0014	10700	1	13.6	1	1.185	1.185	1.185	1.185
ASH PIT 1-SB06	AP0017	10500	1	11.5	1	0.224	0.224	0.224	0.224
ASH PIT 1-SB08	AP0023AP0063	7555	1	11.1	1	0.8555	0.721	1.205	1.815
ASH PIT 1-SB09	AP0026	7650	1	8.94	1	0.268	0.268	0.268	0.268
PBOW99-SBA101A	PBOW99SBA101A/101A-DUP	7550	1	0.71	0	0.2325	0.2325	0.2325	0.2325
PBOW99-SBA102A	PBOW99SBA102A	12700	1	0.65	0	0.215	0.215	0.215	0.215
PBOW99-SBA103A	PBOW99SBA103A	8310	1	0.84	0	0.275	0.275	0.275	0.275
PBOW99-SBA104B	PBOW99SBA104B	8820	1	0.65	0	0.215	0.215	0.215	0.215
PBOW99-SSA101	PBOW99SSA101	16600	1	1.5	1	0.405	0.405	0.405	0.405

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\Documents and Settings\debbi.freer\My Documents\PBOW\AP 1 & 3\UCL files\HH UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aluminum - Surface Soil (AP 1)

General Statistics

Number of Valid Observations	13	Number of Distinct Observations	12

Raw Statistics		Log-transformed Statistics	
Minimum	6190	Minimum of Log Data	8.731
Maximum	16600	Maximum of Log Data	9.717
Mean	9890	Mean of log Data	9.165
Median	9360	SD of log Data	0.269
SD	2820		
Coefficient of Variation	0.285		
Skewness	1.118		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11284	95% H-UCL	11463
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13111
95% Adjusted-CLT UCL	11436	97.5% Chebyshev (MVUE) UCL	14510
95% Modified-t UCL	11325	99% Chebyshev (MVUE) UCL	17257

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.36	**Data appear Normal at 5% Significance Level**	
Theta Star	870.7		
MLE of Mean	9890		
MLE of Standard Deviation	2935		
nu star	295.3		
Approximate Chi Square Value (.05)	256.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0301	95% CLT UCL	11177
Adjusted Chi Square Value	251.4	95% Jackknife UCL	11284
		95% Standard Bootstrap UCL	11152
Anderson-Darling Test Statistic	0.276	95% Bootstrap-t UCL	11676
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	11945
Kolmogorov-Smirnov Test Statistic	0.117	95% Percentile Bootstrap UCL	11180
Kolmogorov-Smirnov 5% Critical Value	0.236	95% BCA Bootstrap UCL	11423
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13299
		97.5% Chebyshev(Mean, Sd) UCL	14774
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	17671
95% Approximate Gamma UCL	11387		
95% Adjusted Gamma UCL	11620		

Potential UCL to Use		Use 95% Student's-t UCL	11284

Beryllium - Surface Soil (AP 1)

General Statistics

Number of Valid Data	13	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	4
		Percent Non-Detects	30.77%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	16.5	Maximum Detected	2.803
Mean of Detected	10.4	Mean of Detected	2.18
SD of Detected	4.536	SD of Detected	0.731
Minimum Non-Detect	0.65	Minimum Non-Detect	-0.431
Maximum Non-Detect	0.84	Maximum Non-Detect	-0.174

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	4
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	9
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	30.77%

Warning: There are only 9 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.748
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.308	Mean	1.19
SD	6.082	SD	1.658
95% DL/2 (t) UCL	10.31	95% H-Stat (DL/2) UCL	20.12
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.032	Mean in Log Scale	1.737
SD	7.747	SD in Log Scale	0.918
95% MLE (t) UCL	9.862	Mean in Original Scale	7.851
95% MLE (Tiku) UCL	10.2	SD in Original Scale	5.437
		95% Percentile Bootstrap UCL	10.21
		95% BCA Bootstrap UCL	10.1

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	2.238	**Data appear Normal at 5% Significance Level**
Theta Star	4.645	
nu star	40.29	
A-D Test Statistic	0.736	**Nonparametric Statistics**
5% A-D Critical Value	0.726	Kaplan-Meier (KM) Method
K-S Test Statistic	0.726	Mean 7.66
5% K-S Critical Value	0.281	SD 5.434
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean 1.599
		95% KM (t) UCL 10.51
Assuming Gamma Distribution		95% KM (z) UCL 10.29
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL 10.54
Minimum	1.5	95% KM (bootstrap t) UCL 10.14
Maximum	16.5	95% KM (BCA) UCL 12.31
Mean	9.214	95% KM (Percentile Bootstrap) UCL 11.4
Median	8.94	95% KM (Chebyshev) UCL 14.63

SD	4.178	97.5% KM (Chebyshev) UCL	17.64
k star	2.982	99% KM (Chebyshev) UCL	23.57
Theta star	3.09		
Nu star	77.53	**Potential UCLs to Use**	
AppChi2	58.25	95% KM (t) UCL	10.51
95% Gamma Approximate UCL	12.26	95% KM (Percentile Bootstrap) UCL	11.4
95% Adjusted Gamma UCL	12.79		

Note: DL/2 is not a recommended method.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\PBOW\AP 1 & 3\UCL files\HH UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Benzo(a)anthracene - Surface Soil (AP 1)

General Statistics

Number of Valid Observations	13	Number of Distinct Observations	12

Raw Statistics		**Log-transformed Statistics**	
Minimum	0.205	Minimum of Log Data	-1.585
Maximum	1.185	Maximum of Log Data	0.17
Mean	0.369	Mean of log Data	-1.185
Median	0.243	SD of log Data	0.56
SD	0.301		
Coefficient of Variation	0.816		
Skewness	2.283		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.585	Shapiro Wilk Test Statistic	0.686
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.518	95% H-UCL	0.509
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.599
95% Adjusted-CLT UCL	0.563	97.5% Chebyshev (MVUE) UCL	0.706
95% Modified-t UCL	0.527	99% Chebyshev (MVUE) UCL	0.916

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	2.214	**Data do not follow a Discernable Distribution (0.05)**
Theta Star	0.167	
MLE of Mean	0.369	
MLE of Standard Deviation	0.248	
nu star	57.56	
Approximate Chi Square Value (.05)	41.12	**Nonparametric Statistics**
Adjusted Level of Significance	0.0301	95% CLT UCL 0.506
Adjusted Chi Square Value	39.15	95% Jackknife UCL 0.518
		95% Standard Bootstrap UCL 0.502
Anderson-Darling Test Statistic	2.136	95% Bootstrap-t UCL 1.078
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL 1.172
Kolmogorov-Smirnov Test Statistic	0.374	95% Percentile Bootstrap UCL 0.518
Kolmogorov-Smirnov 5% Critical Value	0.238	95% BCA Bootstrap UCL 0.573
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 0.733
		97.5% Chebyshev(Mean, Sd) UCL 0.89

Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.2
95% Approximate Gamma UCL	0.516		
95% Adjusted Gamma UCL	0.543		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	0.733

Benzo(a)pyrene - Surface Soil (AP 1)

General Statistics

Number of Valid Observations	13	Number of Distinct Observations	12

Raw Statistics		**Log-transformed Statistics**	
Minimum	0.205	Minimum of Log Data	-1.585
Maximum	1.185	Maximum of Log Data	0.17
Mean	0.359	Mean of log Data	-1.198
Median	0.243	SD of log Data	0.536
SD	0.285		
Coefficient of Variation	0.794		
Skewness	2.521		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.582	Shapiro Wilk Test Statistic	0.698
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.499	95% H-UCL	0.486
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.573
95% Adjusted-CLT UCL	0.548	97.5% Chebyshev (MVUE) UCL	0.672
95% Modified-t UCL	0.509	99% Chebyshev (MVUE) UCL	0.867

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	2.395	**Data do not follow a Discernable Distribution (0.05)**
Theta Star	0.15	
MLE of Mean	0.359	
MLE of Standard Deviation	0.232	
nu star	62.27	
Approximate Chi Square Value (.05)	45.12	**Nonparametric Statistics**
Adjusted Level of Significance	0.0301	95% CLT UCL 0.489
Adjusted Chi Square Value	43.05	95% Jackknife UCL 0.499
		95% Standard Bootstrap UCL 0.483
Anderson-Darling Test Statistic	2.015	95% Bootstrap-t UCL 0.976
Anderson-Darling 5% Critical Value	0.739	95% Hall's Bootstrap UCL 1.021
Kolmogorov-Smirnov Test Statistic	0.367	95% Percentile Bootstrap UCL 0.494
Kolmogorov-Smirnov 5% Critical Value	0.238	95% BCA Bootstrap UCL 0.546
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 0.703
		97.5% Chebyshev(Mean, Sd) UCL 0.852
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1.145
95% Approximate Gamma UCL	0.495	
95% Adjusted Gamma UCL	0.519	
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL 0.703

Benzo(b)fluoranthene - Surface Soil (AP 1)

General Statistics

Number of Valid Observations	13	Number of Distinct Observations	12

Raw Statistics

Minimum	0.205
Maximum	1.205
Mean	0.396
Median	0.243
SD	0.358
Coefficient of Variation	0.905
Skewness	2.093

Log-transformed Statistics

Minimum of Log Data	-1.585
Maximum of Log Data	0.186
Mean of log Data	-1.159
SD of log Data	0.618

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.547
Shapiro Wilk Critical Value	0.866

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.573

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	0.621
95% Modified-t UCL	0.583

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.649
Shapiro Wilk Critical Value	0.866

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	0.568
95% Chebyshev (MVUE) UCL	0.663
97.5% Chebyshev (MVUE) UCL	0.788
99% Chebyshev (MVUE) UCL	1.034

Gamma Distribution Test

k star (bias corrected)	1.825
Theta Star	0.217
MLE of Mean	0.396
MLE of Standard Deviation	0.293
nu star	47.45
Approximate Chi Square Value (.05)	32.64
Adjusted Level of Significance	0.0301
Adjusted Chi Square Value	30.9
Anderson-Darling Test Statistic	2.418
Anderson-Darling 5% Critical Value	0.742
Kolmogorov-Smirnov Test Statistic	0.385
Kolmogorov-Smirnov 5% Critical Value	0.239

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.575
95% Adjusted Gamma UCL	0.608

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.559
95% Jackknife UCL	0.573
95% Standard Bootstrap UCL	0.553
95% Bootstrap-t UCL	1.424
95% Hall's Bootstrap UCL	1.638
95% Percentile Bootstrap UCL	0.549
95% BCA Bootstrap UCL	0.619
95% Chebyshev(Mean, Sd) UCL	0.829
97.5% Chebyshev(Mean, Sd) UCL	1.016
99% Chebyshev(Mean, Sd) UCL	1.385

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 0.829

Indeno(1,2,3-cd)pyrene - Surface Soil (AP 1)

General Statistics

Number of Valid Observations	13
Number of Distinct Observations	12

Raw Statistics

Minimum	0.205
Maximum	1.815
Mean	0.443
Median	0.243
SD	0.489
Coefficient of Variation	1.105
Skewness	2.44

Log-transformed Statistics

Minimum of Log Data	-1.585
Maximum of Log Data	0.596
Mean of log Data	-1.127
SD of log Data	0.697

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.54
Shapiro Wilk Critical Value	0.866

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.685

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	0.764
95% Modified-t UCL	0.7

Gamma Distribution Test

k star (bias corrected)	1.395
Theta Star	0.317
MLE of Mean	0.443
MLE of Standard Deviation	0.375
nu star	36.27
Approximate Chi Square Value (.05)	23.49
Adjusted Level of Significance	0.0301
Adjusted Chi Square Value	22.03
Anderson-Darling Test Statistic	2.459
Anderson-Darling 5% Critical Value	0.747
Kolmogorov-Smirnov Test Statistic	0.395
Kolmogorov-Smirnov 5% Critical Value	0.24

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.684
95% Adjusted Gamma UCL	0.729

Potential UCL to Use

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.647
Shapiro Wilk Critical Value	0.866

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	0.665
95% Chebyshev (MVUE) UCL	0.76
97.5% Chebyshev (MVUE) UCL	0.915
99% Chebyshev (MVUE) UCL	1.217

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.666
95% Jackknife UCL	0.685
95% Standard Bootstrap UCL	0.662
95% Bootstrap-t UCL	2.311
95% Hall's Bootstrap UCL	2.297
95% Percentile Bootstrap UCL	0.675
95% BCA Bootstrap UCL	0.762
95% Chebyshev(Mean, Sd) UCL	1.034
97.5% Chebyshev(Mean, Sd) UCL	1.29
99% Chebyshev(Mean, Sd) UCL	1.793

Use 95% Chebyshev (Mean, Sd) UCL 1.034

Input for ProUCL
Ash Pit 1 Total Soil

			Aluminum	D_Aluminur	Beryllium	D_Beryllium	Cadmium	D_Cadmiun	Manganese	D_Manganese	Benzo(a)anthracene	D_Benzo(a)	Benzo(a)py	D_Benzo(a)	Benzo(b)fluoranthene	D_Benzo(b)fluoranthe	Indeno(1,2,	D_Indeno(1	Indeno(1,2,3-cd)pyrene
ASH PIT 1-SB01	AP0002	SBS	9230	1	4.87	1	0.514	0	251	1	0.199	0	0.199	0	0.199	0	0.199	0	0.0995
ASH PIT 1-SB01	AP0003	SBS	8980	1	5.82	1	0.415	0	524	1	0.206	0	0.206	0	0.206	0	0.206	0	0.103
ASH PIT 1-SB02	AP0005	SBS	8380	1	5.99	1	0.345	1	543	1	0.2095	0	0.2095	0	0.2095	0	0.2095	0	0.10475
ASH PIT 1-SB02	AP0006	SBS	7780	1	5.23	1	0.463	0	472	1	0.2035	0	0.2035	0	0.2035	0	0.2035	0	0.10175
ASH PIT 1-SB03	AP0008	SBS	2770	1	3.62	1	0.449	0	266	1	0.193	0	0.193	0	0.193	0	0.193	0	0.0965
ASH PIT 1-SB03	AP0009	SBS	8470	1	5.49	1	0.277	1	470	1	0.2005	0	0.2005	0	0.2005	0	0.2005	0	0.10025
ASH PIT 1-SB04	AP0011AP0012	SBS	7125	1	7.305	1	0.2815	1	1055.5	1	0.20125	0	0.20125	0	0.20125	0	0.20125	0	0.100625
ASH PIT 1-SB04	AP0013	SBS	10200	1	8.48	1	0.276	1	4470	1	0.206	0	0.206	0	0.206	0	0.206	0	0.103
ASH PIT 1-SB05	AP0015	SBS	6260	1	12.9	1	0.269	1	954	1	0.2005	0	0.2005	0	0.2005	0	0.2005	0	0.10025
ASH PIT 1-SB05	AP0016	SBS	8810	1	7	1	0.492	0	484	1	0.2075	0	0.2075	0	0.2075	0	0.2075	0	0.10375
ASH PIT 1-SB06	AP0018	SBS	13000	1	6.55	1	0.455	0	701	1	0.202	0	0.202	0	0.202	0	0.202	0	0.101
ASH PIT 1-SB06	AP0019	SBS	8870	1	6.71	1	7.66	1	373	1	0.192	0	0.192	0	0.192	0	0.192	0	0.096
ASH PIT 1-SB08	AP0024	SBS	6700	1	11.5	1	0.531	0	469	1	0.0642	1	0.0534	1	0.0829	1	0.312	1	0.312
ASH PIT 1-SB08	AP0025	SBS	11700	1	7.18	1	0.51	0	347	1	0.206	0	0.206	0	0.206	0	0.206	0	0.103
ASH PIT 1-SB09	AP0027	SBS	7640	1	5.85	1	0.467	0	506	1	0.2015	0	0.2015	0	0.2015	0	0.2015	0	0.10075
ASH PIT 1-SB09	AP0058AP0028	SBS	8390	1	6.905	1	0.4615	0	453	1	0.18625	0	0.18625	0	0.18625	0	0.18625	0	0.093125
PBOW99-SBA103B	PBOW99SBA103B	SBS	12600	1	0.315	0	0.25	0	409	1	0.21	0	0.21	0	0.21	0	0.21	0	0.105
ASH PIT 1-SB01	AP0001	SS	6190	1	5.74	1	0.23	1	263	1	0.205	0	0.205	0	0.205	0	0.205	0	0.1025
ASH PIT 1-SB02	AP0004	SS	9360	1	10.8	1	0.2975	1	306	1	0.245	0	0.245	0	0.245	0	0.245	0	0.1225
ASH PIT 1-SB03	AP0007	SS	9940	1	13.9	1	0.263	1	252	1	0.2425	0	0.2425	0	0.2425	0	0.2425	0	0.12125
ASH PIT 1-SB04	AP0010	SS	12700	1	16.5	1	0.2655	1	241	1	0.229	0	0.229	0	0.229	0	0.229	0	0.1145
ASH PIT 1-SB05	AP0014	SS	10700	1	13.6	1	0.2755	1	305	1	1.185	0	1.185	0	1.185	0	1.185	0	0.5925
ASH PIT 1-SB06	AP0017	SS	10500	1	11.5	1	0.2885	1	199	1	0.224	0	0.224	0	0.224	0	0.224	0	0.112
ASH PIT 1-SB08	AP0023AP0063	SS	7555	1	11.1	1	0.26025	0	342	1	0.8555	1	0.721	1	1.205	1	1.815	1	1.815
ASH PIT 1-SB09	AP0026	SS	7650	1	8.94	1	0.305	1	2810	1	0.268	0	0.268	0	0.268	0	0.268	0	0.134
PBOW99-SBA101A	PBOW99SBA101A/101A-DUP	SS	7550	1	0.71	0	0.14	1	825	1	0.2325	0	0.2325	0	0.2325	0	0.2325	0	0.11625
PBOW99-SBA102A	PBOW99SBA102A	SS	12700	1	0.65	0	0.26	1	199	1	0.215	0	0.215	0	0.215	0	0.215	0	0.1075
PBOW99-SBA103A	PBOW99SBA103A	SS	8310	1	0.84	0	0.165	1	125	1	0.275	0	0.275	0	0.275	0	0.275	0	0.1375
PBOW99-SBA104B	PBOW99SBA104B	SS	8820	1	0.65	0	0.13	1	181	1	0.215	0	0.215	0	0.215	0	0.215	0	0.1075
PBOW99-SSA101	PBOW99SSA101	SS	16600	1	1.5	1	0.245	1	1370	1	0.405	0	0.405	0	0.405	0	0.405	0	0.2025

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	AP 1 ts UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aluminum - Total Soil (AP 1)

General Statistics

Number of Valid Observations	30	Number of Distinct Observations	29

Raw Statistics

Minimum	2770
Maximum	16600
Mean	9183
Median	8815
SD	2639
Coefficient of Variation	0.287
Skewness	0.509

Log-transformed Statistics

Minimum of Log Data	7.927
Maximum of Log Data	9.717
Mean of log Data	9.081
SD of log Data	0.319

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.953
Shapiro Wilk Critical Value	0.927

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.897
Shapiro Wilk Critical Value	0.927

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	10001

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	10023
95% Modified-t UCL (Johnson-1978)	10009

Assuming Lognormal Distribution

95% H-UCL	10297
95% Chebyshev (MVUE) UCL	11615
97.5% Chebyshev (MVUE) UCL	12647
99% Chebyshev (MVUE) UCL	14676

Gamma Distribution Test

k star (bias corrected)	10.35
Theta Star	887.6
MLE of Mean	9183
MLE of Standard Deviation	2855
nu star	620.8
Approximate Chi Square Value (.05)	564
Adjusted Level of Significance	0.041
Adjusted Chi Square Value	560.8
Anderson-Darling Test Statistic	0.584
Anderson-Darling 5% Critical Value	0.745
Kolmogorov-Smirnov Test Statistic	0.127
Kolmogorov-Smirnov 5% Critical Value	0.16

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	10107
95% Adjusted Gamma UCL	10164

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	9975
95% Jackknife UCL	10001
95% Standard Bootstrap UCL	9965
95% Bootstrap-t UCL	10034
95% Hall's Bootstrap UCL	10099
95% Percentile Bootstrap UCL	10002
95% BCA Bootstrap UCL	10004
95% Chebyshev(Mean, Sd) UCL	11283
97.5% Chebyshev(Mean, Sd) UCL	12192
99% Chebyshev(Mean, Sd) UCL	13977

Potential UCL to Use

Use 95% Student's-t UCL 10001

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Beryllium - Total Soil (AP 1)

General Statistics

Number of Valid Data	30	Number of Detected Data	25
Number of Distinct Detected Data	24	Number of Non-Detect Data	5
		Percent Non-Detects	16.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	16.5	Maximum Detected	2.803
Mean of Detected	8.199	Mean of Detected	1.997
SD of Detected	3.625	SD of Detected	0.507
Minimum Non-Detect	0.315	Minimum Non-Detect	-1.155
Maximum Non-Detect	0.84	Maximum Non-Detect	-0.174

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	5
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	25
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	16.67%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.945	Shapiro Wilk Test Statistic	0.916
5% Shapiro Wilk Critical Value	0.918	5% Shapiro Wilk Critical Value	0.918
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.885	Mean	1.464
SD	4.45	SD	1.304
95% DL/2 (t) UCL	8.266	95% H-Stat (DL/2) UCL	20.33
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.562	Mean in Log Scale	1.82
SD	4.966	SD in Log Scale	0.613
95% MLE (t) UCL	8.103	Mean in Original Scale	7.258
95% MLE (Tiku) UCL	8.163	SD in Original Scale	3.932
		95% t UCL	8.478
		95% Percentile Bootstrap UCL	8.418
		95% BCA Bootstrap UCL	8.528

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.272	**Data appear Normal at 5% Significance Level**	
Theta Star	1.919		
nu star	213.6		
A-D Test Statistic	0.464	**Nonparametric Statistics**	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	7.083
5% K-S Critical Value	0.175	SD	4.092
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.763
		95% KM (t) UCL	8.378
Assuming Gamma Distribution		95% KM (z) UCL	8.337
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8.285
Minimum	1.5	95% KM (bootstrap t) UCL	8.351
Maximum	16.5	95% KM (BCA) UCL	8.864
Mean	7.331	95% KM (Percentile Bootstrap) UCL	8.522
Median	6.63	95% KM (Chebyshev) UCL	10.41
SD	3.851	97.5% KM (Chebyshev) UCL	11.84
k star	3.181	99% KM (Chebyshev) UCL	14.67

Theta star	2.305		
Nu star	190.9	**Potential UCLs to Use**	
AppChi2	159.9	95% KM (t) UCL	8.378
95% Gamma Approximate UCL	8.751	95% KM (Percentile Bootstrap) UCL	8.522
95% Adjusted Gamma UCL	8.841		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cadmium - Total Soil (AP 1)

General Statistics

Number of Valid Data	30	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	23
		Percent Non-Detects	76.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.26	Minimum Detected	-1.346
Maximum Detected	7.66	Maximum Detected	2.036
Mean of Detected	1.338	Mean of Detected	-0.789
SD of Detected	2.788	SD of Detected	1.249
Minimum Non-Detect	0.13	Minimum Non-Detect	-2.04
Maximum Non-Detect	0.531	Maximum Non-Detect	-0.633

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	29
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	96.67%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.461	Shapiro Wilk Test Statistic	0.51
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.444	Mean	-1.598
SD	1.365	SD	0.815
95% DL/2 (t) UCL	0.867	95% H-Stat (DL/2) UCL	0.397
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.388
		SD in Log Scale	1.111
		Mean in Original Scale	0.358
		SD in Original Scale	1.382
		95% t UCL	0.787
		95% Percentile Bootstrap UCL	0.863
		95% BCA Bootstrap UCL	1.136
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.424	**Data do not follow a Discernable Distribution (0.05)**	

Theta Star	3.157
nu star	5.935
A-D Test Statistic	1.979
5% A-D Critical Value	0.747
K-S Test Statistic	0.747
5% K-S Critical Value	0.326

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.26
Maximum	7.66
Mean	2.737
Median	2.094
SD	1.973
k star	1.245
Theta star	2.199
Nu star	74.67
AppChi2	55.77
95% Gamma Approximate UCL	3.665
95% Adjusted Gamma UCL	3.728

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.515
SD	1.327
SE of Mean	0.262
95% KM (t) UCL	0.96
95% KM (z) UCL	0.946
95% KM (jackknife) UCL	0.929
95% KM (bootstrap t) UCL	38.86
95% KM (BCA) UCL	1.261
95% KM (Percentile Bootstrap) UCL	1.01
95% KM (Chebyshev) UCL	1.656
97.5% KM (Chebyshev) UCL	2.149
99% KM (Chebyshev) UCL	3.119

Potential UCLs to Use

95% KM (BCA) UCL	1.261

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Manganese - Total Soil (AP 1)

General Statistics

Number of Valid Observations	30
Number of Distinct Observations	29

Raw Statistics

Minimum	125
Maximum	4470
Mean	672.2
Median	431
SD	881
Coefficient of Variation	1.311
Skewness	3.45

Log-transformed Statistics

Minimum of Log Data	4.828
Maximum of Log Data	8.405
Mean of log Data	6.119
SD of log Data	0.782

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.542
Shapiro Wilk Critical Value	0.927

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	945.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1045
95% Modified-t UCL (Johnson-1978)	962.4

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical Value	0.927

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	851.5
95% Chebyshev (MVUE) UCL	1025
97.5% Chebyshev (MVUE) UCL	1205
99% Chebyshev (MVUE) UCL	1559

Gamma Distribution Test	
k star (bias corrected)	1.301
Theta Star	516.6
MLE of Mean	672.2
MLE of Standard Deviation	589.3
nu star	78.08
Approximate Chi Square Value (.05)	58.72
Adjusted Level of Significance	0.041
Adjusted Chi Square Value	57.75
Anderson-Darling Test Statistic	2.008
Anderson-Darling 5% Critical Value	0.765
Kolmogorov-Smirnov Test Statistic	0.25
Kolmogorov-Smirnov 5% Critical Value	0.163

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution	
95% Approximate Gamma UCL	893.8
95% Adjusted Gamma UCL	908.7

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics	
95% CLT UCL	936.7
95% Jackknife UCL	945.5
95% Standard Bootstrap UCL	931.5
95% Bootstrap-t UCL	1429
95% Hall's Bootstrap UCL	2115
95% Percentile Bootstrap UCL	952.6
95% BCA Bootstrap UCL	1096
95% Chebyshev(Mean, Sd) UCL	1373
97.5% Chebyshev(Mean, Sd) UCL	1677
99% Chebyshev(Mean, Sd) UCL	2273

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 1373

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(a)anthracene - Total Soil (AP 1)

General Statistics

Number of Valid Data	30	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	28
		Percent Non-Detects	93.33%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0642	Minimum Detected	-2.746
Maximum Detected	0.856	Maximum Detected	-0.156
Mean of Detected	0.46	Mean of Detected	-1.451
SD of Detected	0.56	SD of Detected	1.831
Minimum Non-Detect	0.186	Minimum Non-Detect	-1.681
Maximum Non-Detect	1.185	Maximum Non-Detect	0.17

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	30
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.15	Mean	-2.107
SD	0.161	SD	0.514
95% DL/2 (t) UCL	0.2	95% H-Stat (DL/2) UCL	0.167
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0915
5% K-S Critical Value	N/A	SD	0.144
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0379
		95% KM (t) UCL	0.156
Assuming Gamma Distribution		95% KM (z) UCL	0.154
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.61
Minimum	N/A	95% KM (bootstrap t) UCL	0.0927
Maximum	N/A	95% KM (BCA) UCL	0.856
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.856
Median	N/A	95% KM (Chebyshev) UCL	0.257
SD	N/A	97.5% KM (Chebyshev) UCL	0.328
k star	N/A	99% KM (Chebyshev) UCL	0.469
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.328
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene - Total Soil (AP 1)

General Statistics

Number of Valid Data	30	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	28
		Percent Non-Detects	93.33%

Raw Statistics	Log-transformed Statistics

Minimum Detected	0.0534	Minimum Detected	-2.93
Maximum Detected	0.721	Maximum Detected	-0.327
Mean of Detected	0.387	Mean of Detected	-1.629
SD of Detected	0.472	SD of Detected	1.84
Minimum Non-Detect	0.186	Minimum Non-Detect	-1.681
Maximum Non-Detect	1.185	Maximum Non-Detect	0.17

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	30
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.145
SD	0.142
95% DL/2 (t) UCL	0.189
Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-2.119
SD	0.501
95% H-Stat (DL/2) UCL	0.163
Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0764
SD	0.122
SE of Mean	0.032
95% KM (t) UCL	0.131
95% KM (z) UCL	0.129
95% KM (jackknife) UCL	0.514
95% KM (bootstrap t) UCL	N/A

Maximum	N/A	95% KM (BCA) UCL	0.721
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.721
Median	N/A	95% KM (Chebyshev) UCL	0.216
SD	N/A	97.5% KM (Chebyshev) UCL	0.276
k star	N/A	99% KM (Chebyshev) UCL	0.395
Theta star	N/A		
Nu star	N/A	**Potential UCLs to Use**	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.276
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene - Total Soil (AP 1)

General Statistics

Number of Valid Data	30	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	28
		Percent Non-Detects	93.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0829	Minimum Detected	-2.49
Maximum Detected	1.205	Maximum Detected	0.186
Mean of Detected	0.644	Mean of Detected	-1.152
SD of Detected	0.793	SD of Detected	1.893
Minimum Non-Detect	0.186	Minimum Non-Detect	-1.681
Maximum Non-Detect	1.185	Maximum Non-Detect	0.17

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	29
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	96.67%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.162	Mean	-2.087
SD	0.217	SD	0.552

95% DL/2 (t) UCL	0.23

95% H-Stat (DL/2) UCL	0.177

Maximum Likelihood Estimate(MLE) Method	N/A

MLE method failed to converge properly

Log ROS Method	
Mean in Log Scale	N/A
SD in Log Scale	N/A
Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.12
SD	0.201
SE of Mean	0.052
95% KM (t) UCL	0.209
95% KM (z) UCL	0.206
95% KM (jackknife) UCL	0.856
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	1.205
95% KM (Percentile Bootstrap) UCL	1.205
95% KM (Chebyshev) UCL	0.347
97.5% KM (Chebyshev) UCL	0.445
99% KM (Chebyshev) UCL	0.638

Potential UCLs to Use

97.5% KM (Chebyshev) UCL	0.445

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	AP 1 ts UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Indeno(1,2,3-cd)pyrene - Total Soil (AP 1)

General Statistics

Number of Valid Observations	30
Number of Distinct Observations	26

Raw Statistics

Minimum	0.0931
Maximum	1.815
Mean	0.19
Median	0.104

Log-transformed Statistics

Minimum of Log Data	-2.374
Maximum of Log Data	0.596
Mean of log Data	-2.029
SD of log Data	0.629

SD	0.322
Coefficient of Variation	1.69
Skewness	4.821

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.318
Shapiro Wilk Critical Value	0.927

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.29

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.342
95% Modified-t UCL (Johnson-1978)	0.299

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.518
Shapiro Wilk Critical Value	0.927

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	0.204
95% Chebyshev (MVUE) UCL	0.244
97.5% Chebyshev (MVUE) UCL	0.281
99% Chebyshev (MVUE) UCL	0.353

Gamma Distribution Test

k star (bias corrected)	1.369
Theta Star	0.139
MLE of Mean	0.19
MLE of Standard Deviation	0.163
nu star	82.15
Approximate Chi Square Value (.05)	62.27
Adjusted Level of Significance	0.041
Adjusted Chi Square Value	61.27
Anderson-Darling Test Statistic	7.003
Anderson-Darling 5% Critical Value	0.763
Kolmogorov-Smirnov Test Statistic	0.405
Kolmogorov-Smirnov 5% Critical Value	0.163

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.251
95% Adjusted Gamma UCL	0.255

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.287
95% Jackknife UCL	0.29
95% Standard Bootstrap UCL	0.283
95% Bootstrap-t UCL	0.827
95% Hall's Bootstrap UCL	0.74
95% Percentile Bootstrap UCL	0.294
95% BCA Bootstrap UCL	0.404
95% Chebyshev(Mean, Sd) UCL	0.446
97.5% Chebyshev(Mean, Sd) UCL	0.557
99% Chebyshev(Mean, Sd) UCL	0.774

Potential UCL to Use

Use 95% Chebyshev (Mean, Sd) UCL 0.446

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Input for ProUCL
Ash Pit 1 Overburden Well Gorundwater

	Cobalt	D_Cobalt	Iron	D_Iron	Manganese	D_Mangane	Sulfate	D_Sulfate	Thallium	Chloroform
AP1-MW01 AP3050	22.2	1	4610	1	32300	1	585000	1	34.6	0.48
AP1-MW01 AP3070	6.8	1	4410	1	8290	1	311000	1	5	0.5
AP1-MW02 AP3051	3	1	300	0	351	1	589000	1	5	0.5
AP1-MW02 AP3071	3.6	1	300	0	436	1	358000	1	5	0.5
AP1-MW03 AP3052	1	1	1090	1	136	1	127000	1	5	0.5
AP1-MW03 AP3072	2.7	1	300	0	463	1	109000	1	5	0.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	MW GW AP1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Cobalt - MW Groundwater (AP 1)

General Statistics

Number of Valid Observations	6	Number of Distinct Observations	6

Raw Statistics		Log-transformed Statistics	
Minimum	1	Minimum of Log Data	0
Maximum	22.2	Maximum of Log Data	3.1
Mean	6.55	Mean of log Data	1.398
Median	3.3	SD of log Data	1.038
SD	7.898		
Coefficient of Variation	1.206		
Skewness	2.152		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.706	Shapiro Wilk Test Statistic	0.955
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	13.05	95% H-UCL	50.17
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17.39
95% Adjusted-CLT UCL (Chen-1995)	14.88	97.5% Chebyshev (MVUE) UCL	22.24
95% Modified-t UCL (Johnson-1978)	13.52	99% Chebyshev (MVUE) UCL	31.76

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.7	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	9.357		
MLE of Mean	6.55		
MLE of Standard Deviation	7.828		
nu star	8.401		
Approximate Chi Square Value (.05)	2.969	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0122	95% CLT UCL	11.85
Adjusted Chi Square Value	1.933	95% Jackknife UCL	13.05
		95% Standard Bootstrap UCL	11.45
Anderson-Darling Test Statistic	0.449	95% Bootstrap-t UCL	37.28
Anderson-Darling 5% Critical Value	0.712	95% Hall's Bootstrap UCL	45.11
Kolmogorov-Smirnov Test Statistic	0.272	95% Percentile Bootstrap UCL	12.6

Kolmogorov-Smirnov 5% Critical Value	0.34	95% BCA Bootstrap UCL	13.53
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20.61
		97.5% Chebyshev(Mean, Sd) UCL	26.69
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	38.63
95% Approximate Gamma UCL	18.53		
95% Adjusted Gamma UCL	28.47		
Potential UCL to Use		Use 95% Approximate Gamma UCL	18.53

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Iron - MW Groundwater (AP 1)

General Statistics

Number of Valid Data	6	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	3
		Percent Non-Detects	50.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1090	Minimum Detected	6.994
Maximum Detected	4610	Maximum Detected	8.436
Mean of Detected	3370	Mean of Detected	7.941
SD of Detected	1977	SD of Detected	0.82
Minimum Non-Detect	300	Minimum Non-Detect	5.704
Maximum Non-Detect	300	Maximum Non-Detect	5.704

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.773
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1760	Mean	6.476
SD	2162	SD	1.686
95% DL/2 (t) UCL	3539	95% H-Stat (DL/2) UCL	377429
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	535.3	Mean in Log Scale	6.766
SD	3363	SD in Log Scale	1.454
95% MLE (t) UCL	3302	Mean in Original Scale	1840
95% MLE (Tiku) UCL	3938	SD in Original Scale	2094
		95% t UCL	3563
		95% Percentile Bootstrap UCL	3203
		95% BCA Bootstrap UCL	3243

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL	N/A
95% Adjusted Gamma UCL	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2230
SD	1613
SE of Mean	806.6
95% KM (t) UCL	3855
95% KM (z) UCL	3557
95% KM (jackknife) UCL	4617
95% KM (bootstrap t) UCL	2952
95% KM (BCA) UCL	4610
95% KM (Percentile Bootstrap) UCL	4610
95% KM (Chebyshev) UCL	5746
97.5% KM (Chebyshev) UCL	7267
99% KM (Chebyshev) UCL	10256

Potential UCLs to Use

95% KM (t) UCL	3855
95% KM (Percentile Bootstrap) UCL	4610

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Manganese - MW Groundwater (AP 1)

General Statistics

Number of Valid Observations	6	Number of Distinct Observations	6

Raw Statistics		Log-transformed Statistics	
Minimum	136	Minimum of Log Data	4.913
Maximum	32300	Maximum of Log Data	10.38
Mean	6996	Mean of log Data	7.066
Median	449.5	SD of log Data	2.133
SD	12798		
Coefficient of Variation	1.829		
Skewness	2.151		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test **Lognormal Distribution Test**

Shapiro Wilk Test Statistic	0.641
Shapiro Wilk Critical Value	0.788

Data not Normal at 5% Significance Level

Shapiro Wilk Test Statistic	0.855
Shapiro Wilk Critical Value	0.788

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	17524

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	20492
95% Modified-t UCL (Johnson-1978)	18288

Assuming Lognormal Distribution

95% H-UCL	28267911
95% Chebyshev (MVUE) UCL	23629
97.5% Chebyshev (MVUE) UCL	31449
99% Chebyshev (MVUE) UCL	46810

Gamma Distribution Test

k star (bias corrected)	0.297
Theta Star	23529
MLE of Mean	6996
MLE of Standard Deviation	12830
nu star	3.568
Approximate Chi Square Value (.05)	0.559
Adjusted Level of Significance	0.0122
Adjusted Chi Square Value	0.261
Anderson-Darling Test Statistic	0.711
Anderson-Darling 5% Critical Value	0.756
Kolmogorov-Smirnov Test Statistic	0.385
Kolmogorov-Smirnov 5% Critical Value	0.354

Data follow Appr. Gamma Distribution at 5% Significance Level

Data Distribution

Data Follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	44665
95% Adjusted Gamma UCL	95759

Nonparametric Statistics

95% CLT UCL	15590
95% Jackknife UCL	17524
95% Standard Bootstrap UCL	14991
95% Bootstrap-t UCL	646621
95% Hall's Bootstrap UCL	356105
95% Percentile Bootstrap UCL	16327
95% BCA Bootstrap UCL	17682
95% Chebyshev(Mean, Sd) UCL	29770
97.5% Chebyshev(Mean, Sd) UCL	39624
99% Chebyshev(Mean, Sd) UCL	58980

Potential UCL to Use

Use 95% Adjusted Gamma UCL 95759

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Sulfate - MW Groundwater (AP 1)

General Statistics

Number of Valid Observations	6
Number of Distinct Observations	6

Raw Statistics

Minimum	109000
Maximum	589000
Mean	346500
Median	334500
SD	210555
Coefficient of Variation	0.608
Skewness	0.123

Log-transformed Statistics

Minimum of Log Data	11.6
Maximum of Log Data	13.29
Mean of log Data	12.56
SD of log Data	0.732

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.788

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.868
Shapiro Wilk Critical Value	0.788

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	519711
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL (Chen-1995)	492483
95% Modified-t UCL (Johnson-1978)	520428

Assuming Lognormal Distribution

95% H-UCL	1084751
95% Chebyshev (MVUE) UCL	811390
97.5% Chebyshev (MVUE) UCL	1009548
99% Chebyshev (MVUE) UCL	1398791

Gamma Distribution Test

k star (bias corrected)	1.458
Theta Star	237603
MLE of Mean	346500
MLE of Standard Deviation	286931
nu star	17.5
Approximate Chi Square Value (.05)	9.03
Adjusted Level of Significance	0.0122
Adjusted Chi Square Value	6.946
Anderson-Darling Test Statistic	0.416
Anderson-Darling 5% Critical Value	0.702
Kolmogorov-Smirnov Test Statistic	0.217
Kolmogorov-Smirnov 5% Critical Value	0.335

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	671477
95% Adjusted Gamma UCL	872927

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	487890
95% Jackknife UCL	519711
95% Standard Bootstrap UCL	473925
95% Bootstrap-t UCL	543620
95% Hall's Bootstrap UCL	527393
95% Percentile Bootstrap UCL	470500
95% BCA Bootstrap UCL	472167
95% Chebyshev(Mean, Sd) UCL	721186
97.5% Chebyshev(Mean, Sd) UCL	883313
99% Chebyshev(Mean, Sd) UCL	1201779

Potential UCL to Use

Use 95% Student's-t UCL 519711

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	MW GW AP1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Thallium - MW Groundwater (AP 1)

General Statistics

Number of Valid Observations	6	Number of Distinct Observations	2

Raw Statistics

Minimum	5
Maximum	34.6

Log-transformed Statistics

Minimum of Log Data	1.609
Maximum of Log Data	3.544

Mean	9.933	Mean of log Data	1.932
Median	5	SD of log Data	0.79
SD	12.08		
Coefficient of Variation	1.217		
Skewness	2.449		

Warning: There are only 2 Distinct Values in this data
There are insufficient Distinct Values to perform some GOF tests and bootstrap methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values to compute bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10-15 or more observations for accurate and meaningful bootstrap results.

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.496	Shapiro Wilk Test Statistic	0.496
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	19.87	95% H-UCL	31.82
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.24
95% Adjusted-CLT UCL (Chen-1995)	23.32	97.5% Chebyshev (MVUE) UCL	26.6
95% Modified-t UCL (Johnson-1978)	20.7	99% Chebyshev (MVUE) UCL	37.12

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.87	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	11.41		
MLE of Mean	9.933		
MLE of Standard Deviation	10.65		
nu star	10.44		
Approximate Chi Square Value (.05)	4.222	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0122	95% CLT UCL	18.05
Adjusted Chi Square Value	2.919	95% Jackknife UCL	N/A
		95% Standard Bootstrap UCL	N/A
Anderson-Darling Test Statistic	1.738	95% Bootstrap-t UCL	N/A
Anderson-Darling 5% Critical Value	0.708	95% Hall's Bootstrap UCL	N/A
Kolmogorov-Smirnov Test Statistic	0.516	95% Percentile Bootstrap UCL	N/A
Kolmogorov-Smirnov 5% Critical Value	0.337	95% BCA Bootstrap UCL	N/A
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	31.44
		97.5% Chebyshev(Mean, Sd) UCL	40.74
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	59.02
95% Approximate Gamma UCL	24.58		
95% Adjusted Gamma UCL	35.54		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	31.44

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Chloroform - MW Groundwater (AP 1)

General Statistics

Number of Valid Observations	6	Number of Distinct Observations	2

Raw Statistics

Minimum	0.48
Maximum	0.5
Mean	0.497
Median	0.5
SD	0.00816
Coefficient of Variation	0.0164
Skewness	-2.449

Log-transformed Statistics

Minimum of Log Data	-0.734
Maximum of Log Data	-0.693
Mean of log Data	-0.7
SD of log Data	0.0167

Warning: There are only 2 Distinct Values in this data
There are insufficient Distinct Values to perform some GOF tests and bootstrap methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values to compute bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10-15 or more observations for accurate and meaningful bootstrap results.

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.496
Shapiro Wilk Critical Value	0.788

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.503

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.499
95% Modified-t UCL (Johnson-1978)	0.503

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.496
Shapiro Wilk Critical Value	0.788

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	N/A
95% Chebyshev (MVUE) UCL	0.511
97.5% Chebyshev (MVUE) UCL	0.518
99% Chebyshev (MVUE) UCL	0.53

Gamma Distribution Test

k star (bias corrected)	2180
Theta Star	0.0002278
MLE of Mean	0.497
MLE of Standard Deviation	0.0106
nu star	26163
Approximate Chi Square Value (.05)	25788
Adjusted Level of Significance	0.0122
Adjusted Chi Square Value	25651
Anderson-Darling Test Statistic	1.718
Anderson-Darling 5% Critical Value	0.696
Kolmogorov-Smirnov Test Statistic	0.506
Kolmogorov-Smirnov 5% Critical Value	0.332

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.504
95% Adjusted Gamma UCL	0.507

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.502
95% Jackknife UCL	N/A
95% Standard Bootstrap UCL	N/A
95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% Chebyshev(Mean, Sd) UCL	0.511
97.5% Chebyshev(Mean, Sd) UCL	0.517
99% Chebyshev(Mean, Sd) UCL	0.53

Potential UCL to Use	Use 95% Student's-t UCL 0.503
	or 95% Modified-t UCL 0.503

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX C

TOXICOLOGICAL PROFILES

Introduction to the Toxicological Profiles

1.0 Purpose and Use of the Toxicological Profiles

Human health toxicological profiles are presented for each chemical of potential concern (COPC), each chemical for which documentation of chemical-specific values is required or about which there are chemical-specific issues that require resolution. The toxicological profiles provide documentation of the chemical-specific physical properties and toxicity values used in the risk assessment (RA). They also discuss the identity, classification and uses of the chemical, the common sources of release to the environment and the fate of the chemical in the environment, including the relevance of aquatic and terrestrial food-chain pathways to human health. A brief review of toxicokinetics discusses absorption, distribution, metabolism or biotransformation, excretion of the parent compound and metabolites, and mechanism of toxicity including identifying the ultimate toxicant – i.e., the moiety (parent chemical or metabolite) identified as most likely responsible for the adverse effects associated with the chemical. This information may be helpful to determine whether laboratory animals may serve as appropriate models for toxicity to humans, and to clarify the nature of toxicological interactions with other chemicals. A discussion of dermal exposure provides perspective on the significance of dermal uptake, and documents the development of dermal toxicity values and the extent or rate of dermal uptake from soil or water according to the latest USEPA (2004) guidance.

The noncancer effects evaluation and carcinogenicity evaluation provide an overall perspective on the nature of the adverse effects associated with the chemical, as well as documentation of the toxicity values. Chemical-specific issues or controversies that may influence the interpretation or application of the results of the RA are also discussed herein. The toxicity values used in the RA are summarized in a table.

The overall purpose of the toxicological profiles is to provide perspective on characteristics of each of the chemicals included in the RA so that the numerical risk estimates can be interpreted and applied wisely in the management of the site.

2.0 Chemical Identity

The identity of the chemical or chemical class is given in the title of each profile; additional information or clarification is provided in the *Introduction and Physical Properties* Section as required. The hyphenated number in parentheses following the chemical name is its unique Chemical Abstract Service (CAS) registration number. The CAS number may be located in the profile title, text, or in the case of multiple isomers or members of a chemical class, in the table that provides the physical properties.

3.0 Physical Properties

The toxicological profiles also provide documentation for the physical properties or constants that are important for chemical transport modeling, such as molecular weight (MW) in grams per mole (g/mole), the log of the octanol/water partition coefficient (log K_{ow}), Henry's Law constant (H) in atmosphere-cubic meters per mole (atm-m^3/mole), the soil/water partition coefficient (K_d) in liters per kilogram (L/kg) for metals, the log of the soil/organic carbon partition coefficient (log K_{oc}) (unitless) for organic chemicals, diffusivity in air (D_a) in square centimeters per second (cm^2/s), diffusivity in water (D_w) in cm^2/s, vapor pressure (VP) in atmospheres (atm), solubility

in water (S) in milligrams per liter (mg/L), and, for volatile organic compounds (VOC), boiling point of pure compound (T_b) in degrees Kelvin (°K), critical temperature (T_c) in °K, and enthalpy of vaporization at the boiling point ($\Delta H_{v,b}$) in calories per mole (cal/mol). Organic chemicals are designated as VOCs or semivolatile organic compounds (SVOC) based on their propensity to volatilize from environmental media. Chemicals designated as VOCs generally have an H greater than 1E-5 atm-m^3/mole (EPA, 2002).

The physical constants generally are taken from the most reliable source (i.e., the source that provides the highest level of documentation). Values for interrelated properties are usually taken from the same source (e.g., H is often estimated from VP and S; therefore, the same source is generally used for all three property values). When one source provides several values for a given property, professional judgment is used to select the most appropriate. Obvious outliers may be dropped from consideration. The average or the midpoint of a range of values may be selected. K_d values for metals and K_{oc} values for ionizing organic compound are based on a default pH of 6.8 (EPA, 2002) if the data are available. VP, S and H values are limited to those provided for normal ambient temperatures (0 to 30 °C) and the reference temperature is provided.

When values for H are not located, they are calculated as follows, provided the requisite information is available (EPA, 1998):

$$H = \frac{VP \bullet MW}{S}$$

where:

H	=	Henry's law constant (atm-m^3/mole, calculated)
VP	=	vapor pressure (atm)
MW	=	molecular weight (g/mole)
S	=	solubility in water (mg/L).

When values for K_{oc} are not located, they are calculated as follows for phthalates and polyaromatic aromatic hydrocarbons (PAH) provided log K_{ow} is available (EPA, 1998):

$$\log K_{oc} = 0.97 \log K_{ow} - 0.094$$

where:

K_{oc}	=	soil/organic carbon partition coefficient (unitless, calculated)
K_{ow}	=	octanol/water partition coefficient (unitless).

K_{oc} for other organic chemicals is calculated as follows provided log K_{ow} is available (EPA, 1998):

$$\log K_{oc} = 0.78 \log K_{ow} + 0.151$$

where:

K_{oc} = soil/organic carbon partition coefficient (unitless, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

When values for D_a are not located, they are calculated as follows (EPA, 1998):

$$D_a = \frac{1.9}{MW^{2/3}}$$

where:

D_a = diffusivity in air (cm^2/s, calculated)
MW = molecular weight (g/mole).

When values for D_w are not located, they are calculated as follows (EPA, 1998):

$$D_w = \frac{22E{-}5}{MW^{2/3}}$$

where:

D_w = diffusivity in water (cm^2/s, calculated)
MW = molecular weight (g/mole).

Values for T_b, T_c and $\Delta H_{v,b}$ for VOCs are preferentially taken from EPA (2004), unless there is evidence that values provided by other sources (HSDB, 2010; NIST, 2010) are more reliable. If values are not located for these variables, they may be estimated by the most appropriate technique for the specific chemical or class to which it belongs as recommended by Lyman et al. (1990). The estimation method used is identified by footnote in the table of physical properties.

4.0 Environmental Release, Fate and Transport

The toxicological profiles also present the predominant sources of release to the environment as well as a qualitative or semi-quantitative description of the fate and transport of the chemical in air, water, sediment, and soil. No attempt is made to present detailed quantitative data because environmental fate is usually highly dependent on climatic conditions and the characteristics of the medium of interest, both of which may differ from location to location and change from time to time. The source and fate information may provide perspective regarding the likelihood that the chemical's presence is related to site activities, that the chemical will migrate across media, or that the chemical will persist at toxicologically significant levels.

Biotransfer factors are provided for chemicals for which food-chain pathways may be significant, which includes a few inorganic chemicals and those organic chemicals that are highly lipophilic, persist in the environment, and are resistant to metabolism by lower trophic organisms in the food chain. High lipophilicity is indicated by a log K_{ow} greater than 3 (Lyman et al., 1990). Lipophilicity enhances partitioning to biomedia and passage across biological

membranes. Persistence in the environment is evidence that the chemical might resist biotransformation and, therefore, remain in edible tissues at toxicologically significant concentrations. Toxicokinetic data, when available, clarify the potential for biotransfer. Biotransformation products may be more toxic than the parent compound, but they tend to be short-lived or more quickly removed from the body, reducing the likelihood of significant bioaccumulation. Similarly, VOCs tend to be mobile and labile (i.e., subject to rapid and extensive biotransformation and excretion), and generally do not participate significantly in food-chain pathways. Therefore, biotransfer factors are not estimated for VOCs, with few exceptions. Some SVOCs, however, are highly lipophilic and may persist. Biotransfer factors generally are not estimated unless empirical data suggest that participation in food-chain pathways is likely to be significant.

The biotransfer factors of interest are water-to-fish bioconcentration factors (BCF) or bioaccumulation factors (BAF), or biota-sediment accumulation factors (BSAF), soil-to-plant biotransfer factors (Bp), cattle ingestion-to-beef factors (Bb) and cattle ingestion-to-milk factors (Bm). Separate soil-to-plant biotransfer factors are available for the reproductive parts of plants (e.g., fruits, seeds) and the vegetative parts of plants (e.g., stems, leaves) for inorganic and some organic chemicals. Soil-to-plant factors for the reproductive parts of plants are designated Bpr; soil-to-plant factors for the vegetative parts of plants are designated Bpv.

Most chemicals in surface water bodies remain predominantly in the dissolved phase in the water column or partition to sediment, which generally settles to the bottom. The difference in concentration between surface water and sediment is usually upwards of an order of magnitude. Theoretically it is appropriate to evaluate biotransfer from both media, using BCF to quantify uptake from water and BSAF to quantify uptake from sediment. Quantification of biotransfer, however, is accompanied by considerable uncertainty and variability because field conditions cannot be readily duplicated in the laboratory where BCF values are generally measured. Therefore, the biotransfer models for either medium are intentionally designed to be very conservative to ensure protection of human health. Consequently, evaluating biotransfer from both water and sediment captures the conservatism of both models and is likely to grossly overestimate total biotransfer. Therefore, most chemicals with the potential to participate significantly in aquatic food chain pathways are evaluated for bioconcentration from surface water *or* bioaccumulation from sediment, depending on which pathway is expected to predominate, but not both.

BCF values are adopted from empirical data when the data are clearly the best choice (i.e., similar results in multiple species of fin fish). When the empirical data are few or inconsistent, BCFs for inorganic chemicals are taken from various sources. BCF values for organic chemicals are generally estimated from the Bintein and Devillers model (Devillers et al., 1996):

$$\log BCF = 0.910 \log K_{ow} - 1.975 \log(6.8E{-}7 K_{ow} + 1) - 0.786$$

where:

BCF = bioconcentration factor (L/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

The Bintein and Devillers model is selected over simpler models adopted by the EPA largely because the Bintein and Devillers approach has undergone scrutiny since first published (Bintein and Devillers, 1993), and considerable effort was expended to validate the model; i.e., to compare modeled and empirical results. The Bintein and Devillers model is probably more realistic than simpler models, particularly for chemicals with higher log K_{ow} values. BSAF values are chosen instead of BCFs for those very highly lipophilic chemicals such as the polychlorinated biphenyls (PCB), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and selected organochlorine pesticides expected to partition almost entirely to benthic sediment.

Soil-to-plant biotransfer factors (Bp) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bp = 1.588 - 0.578 \log K_{ow}$$

where:

Bp = soil-to-plant biotransfer factor (unitless, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

Separate biotransfer factors are not estimated for the reproductive parts of plants (Bpr) and the vegetative parts of plants (Bpv) by the Travis and Arms model.

Cattle ingestion-to-beef factors (Bb) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bb = -7.6 + \log K_{ow}$$

where:

Bb = cattle ingestion-to-beef biotransfer factor (days/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

Cattle ingestion-to-milk factors (Bm) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bm = -8.10 + \log K_{ow}$$

where:

Bm = cattle ingestion-to-milk biotransfer factor (days/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

It should be understood that the biotransfer models described above depend only on one or two physical property values that are related largely to the propensity for transfer across biological membranes. Many compounds have relatively large log K_{ow} values, indicating ready passage across membranes; however, they are sufficiently volatile, or are otherwise mobile or labile so

they are unable to persist in biological tissues. For example, many constituents with high log K_{ow} values are efficiently metabolized by lower trophic organisms in the food chain so that significant human exposure does not occur. Such is the case for practically all VOCs and most SVOCs; relatively few compounds participate significantly in food-chain pathways. Therefore, biotransfer is evaluated as a potential pathway only for those chemicals with empirical data that indicate food-chain exposure could be significant.

5.0 Toxicokinetics

A toxicokinetics section was added to the toxicological profiles in early 2004. Toxicokinetics describes the uptake or absorption of the chemical from contact media, the distribution of the chemical (or its metabolites) within the body following absorption, the metabolism or biotransformation of the chemical, and the mechanisms of excretion of the parent compound and its biotransformation products from the body. The toxicokinetics section documents the gastrointestinal (GI) absorption factor (GAF) required to develop toxicity factors for dermal exposure, because dermal risk characterization depends on an absorbed dose rather than an exposure dose. The toxicokinetics section also identifies the compounds that are rapidly metabolized or eliminated, which justifies excluding their evaluation in food-chain pathways even though they may have a large K_{ow} that indicates ready passage across cell membranes. This section also tries to identify the ultimate toxicant and elucidate the most important mechanism(s) of toxicity.

6.0 Dermal Exposure

The toxicological profiles provide the documentation for the GAF, which is used to develop the dermal toxicity values. The toxicological profiles also provide documentation for the dermal absorption factor (ABS), which describes the extent of dermal uptake from soil, and the time for dermal uptake to reach steady state (t*), the permeability coefficient (K_p), the lag time for chemical to cross the stratum corneum (τ), the fraction absorbed (FA), and the ratio of the permeability coefficient for passage across the stratum corneum to the permeability coefficient for passage across the viable epidermis (B), all which are used to estimate the rate of dermal uptake from water. These values are taken from EPA (2010) if available. Otherwise, they are estimated by the EPA (2004) methods.

7.0 Toxicity Evaluation

The toxicological profile contains a brief description of the nature of the adverse effects associated with the chemical. It is important to note that a discussion of adverse effects without a discussion of dose is incomplete and potentially misleading, because virtually any chemical may be toxic at some dose, and many chemicals (e.g., nutritionally required minerals, vitamins, amino acids, etc.) enhance human health at some low dose. An ever growing and compelling body of evidence suggests that many environmental contaminants also enhance health at low doses (Hart and Frame, 1996).

7.1 Noncancer Evaluation

The toxicity values for noncancer effects include a reference dose (RfD) expressed in milligrams per kilogram per day (mg/kg-day) for chronic or subchronic oral exposure, and a reference concentration (RfC), in milligrams per cubic meter (mg/m^3), for chronic or subchronic inhalation exposure. The inhalation RfC in units of mg/m^3 may be converted to an equivalent inhalation

RfD by assuming continuous chronic exposure of humans with a body weight of 70 kg and an inhalation rate of 20 m^3/day (EPA, 1989, 1991). In other words, the RfC expressed as mg/m^3 is multiplied by the inhalation rate of 20 m^3/day, and the result is divided by the assumed adult body weight of 70 kg to yield an inhalation RfD expressed as mg/kg-day.

RfD and RfC values are usually derived from empirical benchmark doses (BMD) or concentrations called no-observed-effect levels (NOEL) or no-observed-adverse-effect levels (NOAEL) from animal toxicity or human epidemiology studies. If the data do not permit identifying a NOEL or NOAEL, a lowest-observed-adverse-effect level (LOAEL) or lowest-effect level (LEL) may be used. A frank-effect level (FEL), e.g., mortality, shortened life span or serious physiologic, neurologic or behavioral disturbances, is generally considered an inappropriate benchmark from which to develop an RfD or RfC. Some RfD and RfC derivations employ a BMD that is a statistically estimated dose for humans at which some low proportion of the population may experience some minimally adverse effect. A BMD at which 10 percent of the population may be expected to experience such an effect is expressed as BMD_{10}. The RfD or RfC is derived by dividing the benchmark level (e.g., NOAEL or BMD_{10}) by a series of uncertainty and modifying factors, which collectively are designated the uncertainty factor (UF).

RfD and RfC values are not currently available for acute toxicity and acute exposure is not evaluated in the RA. Nonetheless, the levels associated with acute lethality and data regarding the effects of acute exposure to levels higher than ordinarily observed in chronic environmental exposure provide additional perspective regarding the toxicity of the chemical. Therefore, information regarding acute toxicity, when available, is included in the profiles. Lethality data for laboratory animals are generally expressed as the oral dose associated with lethality of 50 percent of an exposed population (LD_{50}) or the concentration in air associated with lethality of 50 percent of an exposed population (LC_{50}). Occasionally the dose associated with lethality in a low percentage of an exposed population (LD_{LO}) is presented.

RfD and RfC values are derived for both chronic and subchronic exposure. For purposes of the RA, chronic exposure is defined as equal to or greater than 7 years, i.e., at least 10 percent of expected life span; subchronic exposure is defined as 2 weeks to 7 years.

Under the assumption of monotonicity (i.e., incidence, intensity, or severity of effects can increase, but cannot decrease, with increasing magnitude or duration of exposure), a chronic RfD may be considered sufficiently protective for subchronic exposure, but a subchronic RfD may not be protective for chronic exposure. Currently, verified subchronic RfD values are unavailable. Provisional subchronic RfDs exist for few chemicals and are compiled in the Health Effects Assessment Summary Tables (HEAST) (EPA, 1997) and some National Center for Environmental Assessment (NCEA) or Provisional Peer Reviewed Toxicity Value (PPRTV) derivations. Although once updated semi-annually, the HEAST is no longer updated, because the EPA (2005) Integrated Risk Information System (IRIS) is generally considered the source of the highest quality toxicity values. For some chemicals the PPRTV derivations are more recent and it is known that summaries on IRIS will be replaced with the PPRTV derivations. In these cases the PPRTV values will be selected preferentially to those on IRIS. Subchronic RfD and RfC values are generally obtained from EPA (1997) or more recent NCEA or PPRTV evaluations, or they may be derived *de novo* from the toxicological data set or from chronic RfD values as follows:

- If the UF applied in the derivation of the chronic RfD does not provide for expansion from subchronic to chronic exposure (e.g., if the chronic RfD was derived from a chronic study), the chronic RfD is adopted as being sufficiently protective for subchronic exposure.

- If the UF applied in the derivation of the chronic RfD contains a component to expand from subchronic to chronic exposure, the subchronic RfD is derived by multiplying the chronic RfD by the component of the UF used to expand from subchronic to chronic exposure (e.g., if a factor of 10 was used to expand from subchronic to chronic exposure, the subchronic RfD will be 10 times larger than the chronic RfD).

7.2 Carcinogenicity Evaluation

The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect (EPA, 1986, 2005). EPA (2005) recognizes five weight-of-evidence group classifications for carcinogenicity. Formerly, EPA (1986) used a letter-based system to describe the weight of evidence for carcinogenicity. Reference to this former system is included because many of the carcinogenicity assessments listed on the Integrated Risk Information System (IRIS) use the former letter-based system (EPA, 2010). The five EPA weight-of-evidence classifications are as follows:

- ***Carcinogenic to Humans*** (corresponds to the former Group A - Human Carcinogen).

- ***Likely to be Carcinogenic to Humans*** (includes both the former Group B1 and Group B2-Probable Human Carcinogens)

- ***Suggestive Evidence of Carcinogenic Potential*** (corresponds to the former Group C - Possible Human Carcinogen)

- ***Inadequate Information to Assess Carcinogenic Potential*** (corresponds to the former Group D - Not Classifiable as to Human Carcinogenicity)

- ***Not Likely to be Carcinogenic to Humans*** (corresponds to the former Group E - Evidence of Noncarcinogenicity to Humans).

Toxicity values for cancer risk include a slope factor (SF) for oral exposure, expressed as the risk per mg/kg-day ingested dose, and a unit risk factor (URF) for inhalation exposure, expressed as the risk per microgram per cubic meter ($\mu g/m^3$) in ambient air. These quantitative estimates are generally provided for chemicals in EPA weight-of-evidence Groups A, B and C if the data are adequate. The SF or URF is usually estimated as an upper bound on the slope of the dose- or concentration-response curve from animal toxicity or human epidemiology studies. The inhalation URF in units of risk per $\mu g/m^3$ may be converted to an equivalent inhalation SF in units of risk per mg/kg-day by assuming continuous lifetime exposure of humans with a body weight to 70 kg and an inhalation rate of 20 m^3/day. In other words, the URF expressed as risk per $\mu g/m^3$ is divided by the inhalation rate of 20 m^3/day, and multiplied by the assumed body weight of 70 kg and a conversion factor of 1000 μg/mg.

EPA (1986, 2005) generally assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk. A few potential carcinogens are understood to require a threshold for carcinogenic expression. Such chemicals are more appropriately evaluated with an RfD developed as described above.

7.3 Hierarchy for Selecting Toxicity Data

Toxicity values generally are chosen using the following hierarchy:

- The EPA's (2010) on-line IRIS database containing toxicity values that have undergone the most rigorous Agency review.
- PPRTV derivations for the Superfund Technical Support Center (STSC); there may be individual chemicals for which the PPRTV derivations supercede those on IRIS.
- Older NCEA derivations for the STSC, HEAST (EPA, 1997), or other EPA documents or memoranda.

When EPA-derived toxicity values are not located in any of the above sources, Minimal Risk Levels (MRL) from the Agency for Toxic Substances Disease Registry (ATSDR) toxicological profiles may be adopted or adapted for use in the RA. MRLs are derived by a methodology similar to the EPA methodology for RfD derivation. ATSDR toxicological profiles generally identify levels significant to human health with particular emphasis on target organ and mechanism of toxicity. Also, the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) has derived toxicity values for certain chemicals (and their degradation products) associated with military use. Finally, the primary literature may be surveyed to determine whether sufficient data exist to derive a toxicity value using the EPA methodology. The use of surrogate chemicals is also considered if the chemical structure, adverse effects, and toxic potency of the surrogate and chemical of interest are judged to be sufficiently similar.

GAFs, used to derive dermal RfD values and SFs from the corresponding oral toxicity values, are obtained from the following hierarchy:

- EPA (2004)
- Empirical data
- PPRTV summaries or NCEA position papers
- Federal agency reviews of the empirical data, such as ATSDR toxicological profiles and various EPA criteria documents
- Other published reviews of the empirical data.

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METALS

ALUMINUM (7429-90-5)

1.0 Introduction and Physical Properties

Aluminum is a naturally occurring **metal** (ATSDR, 2008). It is the third most abundant element in nature, constituting approximately 8 percent of the minerals in the earth's crust. Aluminum is highly reactive; thus, is always found in combination with other substances such as oxygen, fluoride or silica. Aluminum is used in a wide variety of metallurgical applications, including packaging (particularly food items), kitchen utensils, auto bodies and components, airplanes, building components, electrical transmission, and to adsorb occluded gases in making steel (ATSDR, 2008; Elinder and Sjogren, 1986; HSDB, 2010). Aluminum compounds are used in testing for gold, arsenic and mercury, in metal alloys, in protective coatings, paints and printer inks, in cosmetics, food additives and some pharmaceuticals, as coagulating agents in the treatment of drinking water, and in photography flash bulbs and fireworks. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
26.98[a] (Element)	NA	NA	1500[b]	NA	NA	NA	Note 1[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line, accessed 29 November.
[b]Baes, C.F., R.D. Sharp, A.L. Sjoreen, R.W. Shor, 1984, ***A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture***, Health and Safety Division, Oak Ridge National Laboratory, ORNL-5786, September.
[c]Solubility of aluminum compounds varies from essentially insoluble in hot or cold water to highly soluble to highly reactive (e.g., aluminum chloride reacts explosively with water liberating heat and hydrogen chloride gas). Agency for Toxic Substances and Disease Registry (ATSDR), 2008, ***Update Toxicological Profile for Aluminum***, U.S. Department of Health and Human Services, Atlanta, Georgia, July, on line.

2.0 Environmental Fate and Transport

Aluminum is one of the few elements for which natural release far outweighs anthropogenic release (ATSDR, 2008; HSDB, 2010). The predominant natural process is the weathering and release of dust from soil and rocks into the air. Major anthropogenic sources include aluminum mining and smelting, coal combustion, and other mining or industrial activities that process crustal materials and release aluminum to the atmosphere. Aluminum exists in the air as particulates that presumably are subject to wet and dry deposition. Large particulates predominate, which suggests that deposition occurs not far from the point of release.

Aluminum is deposited on soil from the atmosphere (ATSDR, 2008). Other anthropogenic sources to soil include wastes from mines, smelters and coal combustion. Aluminum in soil exists in several soluble and insoluble forms, depending on pH and the nature of the minerals and organic material present in the soil. Generally, increasing acidity (decreasing pH) mobilizes aluminum and facilitates leaching.

Aluminum exists naturally in water in several hydrated and complexed forms (ATSDR, 2008). Sources include solution from surrounding soil, precipitation, and runoff and erosion from soil. The extent to which aluminum in water settles out is highly variable and depends on pH and the other constituents present in the water with which aluminum may form compounds and complexes. Generally an equilibrium is established between soluble and insoluble forms.

Bioconcentration in fish is largely a function of water quality (e.g., pH and total organic carbon). Highest concentrations of aluminum are generally found in the gills and lowest concentrations are found in edible muscle tissue. Concentrations decrease as the fish pass through the larval and juvenile stages. Therefore, the bioconcentration of aluminum in edible fish tissues is not expected to represent a toxicologically significant source to humans (EPA, 1995).

Acid conditions in soil mobilize aluminum for uptake by plants, but the extent of uptake and the distribution between the roots and the aerial parts is highly dependent on the species of plant (ATSDR, 2008). Teas and some herbs may bioconcentrate aluminum; however, these items are unlikely to contribute significantly to the diet. Aluminum does not accumulate significantly in cow's milk or beef, and is not expected to undergo biomagnification in terrestrial food chains. For these reasons biotransfer is not expected to contribute significantly to human exposure and biotransfer factors are not compiled or estimated.

3.0 Toxicokinetics

Aluminum is poorly absorbed following inhalation exposure (ATSDR, 2008). Evidence suggests that the epithelium of the upper and lower respiratory tract can absorb aluminum, and that absorption is somewhat more efficient for aluminum fumes (occupational exposure) rather than dust. Aluminum can be retained in the lungs for long periods. Also, it has been shown that aluminum absorbed by the olfactory epithelium can reach the brain directly via axonal transfer.

Dietary aluminum is absorbed from the GI tract in the range of 0.1 to 0.3 or perhaps 0.5 percent (ATSDR, 2008). Unusually bioavailable forms such as carboxylic acid complexes may be absorbed at 1 percent of the administered dose. Ingestion of large amounts of aluminum in antacid preparations can increase total absorption, but factors other than the amount ingested appear to reduce the proportion of the total dose that is absorption.

ATSDR (2008) concluded that aluminum is "essentially not absorbed dermally," although the data are confusing and one study in mice verifies that dermal uptake occurs. Quantitative data were not located.

Normal humans have a body burden of aluminum in the 30 to 50 mg range, with approximately one-half located in the skeleton and one-fourth in the lungs (ATSDR, 2008). Body burden generally increases with age. The amount in the lungs probably reflects accumulation from inhalation of aluminum in dust. Levels in brain tissue range from 0.25 to 0.75 mg/kg wet weight in the white matter and approximately twice that in the gray matter.

Aluminum following inhalation exposure is associated largely with the lungs and thoracic lymph nodes (ATSDR, 2008). In humans, increased levels are seen also in the liver and spleen. Increased levels in these tissues have not been seen in animals exposed via inhalation. Some

inhaled particulates are cleared from the respiratory tract by mucocilliary elevation and are swallowed, thereby becoming available for GI absorption.

Animal studies with ingested aluminum suggest that distribution is preferentially to various regions of the brain (ATSDR, 2008). Prolonged studies with rats indicate that distribution also occurs to bone, muscle and kidneys, but that tissue levels return to normal shortly after exposure ceases. Limited evidence in animals suggests that transplacental distribution and excretion via lactation also occur. Vitamin D and related compounds may increase uptake and tissue retention. Distribution studies following administration by various parenteral routes yielded quite variable results, suggesting that the target tissues may be specific to the form of aluminum administered. The brain was clearly not reported as the most predictable target tissue for all forms of aluminum administered to all species by parenteral routes.

Aluminum in the body may occur in the form of free ions (Al^{+3}), low-molecular-weight complexes (particularly stable chelates), macromolecular complexes, or covalently bound macromolecular complexes (ATSDR, 2008). All forms may be metabolically active. Essentially irreversible complexes may be formed in the nucleus and chromatin material of the cell.

The kidney is the primary organ for excretion of absorbed aluminum (ATSDR, 2008). Urinary excretion patterns after inhalation exposure (i.e., prolongation of elevated urinary levels of aluminum) indicate that body burden and excretion half-life both increase with prolonged exposure. Excretion is lower in premature infants than full-term infants, probably because glomerular filtration is underdeveloped before birth. This suggests that the unborn and premature may be unusually sensitive to the effects of aluminum.

4.0 Dermal Exposure

As noted above, ATSDR (2008) concluded that aluminum is essentially not absorbed dermally. Therefore, the likelihood of systemic toxic effects arising from dermal exposure to aluminum is very small, and no attempt is made to quantify dermal uptake or risk.

5.0 Noncancer Effects Evaluation

Aluminum is relatively nontoxic via ingestion to physiologically normal humans, but recently concern has arisen regarding neurological effects, including Alzheimer's disease and similar forms of dementia (EPA, 2006). Much of this concern stems from studies with large oral doses of soluble aluminum salts (e.g., aluminum hydroxide) and from medical procedures that bypass the GI absorption barrier (i.e., parenteral administration). A review of several animal studies with many different forms of aluminum suggests that the developing infant is potentially the most sensitive member of the human population. A provisional chronic oral RfD of 1E+0 mg/kg-day was derived from a LOAEL of 100 mg/kg-day for minimal and equivocal neurological effects in the offspring of mice. The mice were fed diets fortified with aluminum lactate throughout gestation and lactation. An uncertainty factor of 100 (factor of 10 for interspecies extrapolation, and factors of 3 each for a minimal LOAEL and for intraspecies variation) was used. Confidence in the oral RfD is low. The nervous system is the target organ for oral exposure to aluminum. (The nervous system rather than the CNS is chosen as the target organ because it cannot be stated unequivocally that some of the neurologic effects observed do not involve the peripheral nerves.)

EPA (1997) provides no subchronic oral RfD for aluminum, and one cannot be derived from the key study for the chronic oral RfD. Therefore, the chronic oral RfD of 1E+0 mg/kg-day is adopted as sufficiently protective for subchronic oral exposure.

Occupational exposure to aluminum metal dust and aluminum oxide is associated with pulmonary fibrosis and related respiratory effects such as cough, emphysema, pneumonia and decreased pulmonary function (ACGIH, 1991). The toxicity of occupational exposure to dusts of aluminum pyro powders is somewhat higher, and occupational exposure to salts such as the sulfate and chloride may yield hydrolysis to the corresponding acids, which are irritants in their own right. Pulmonary effects were also observed in animals exposed to powders and dusts of metallic aluminum and various aluminum compounds.

Results of testing Canadian gold and uranium miners prophylactically treated with aluminum oxide powders to prevent silicosis associated aluminum exposure with impaired cognitive performance (EPA, 2006). The likelihood of cognitive impairment was directly related to the duration of exposure. Neurological performance was also impaired in aluminum foundry workers exposed to fumes and aluminum dust (4.6 to 11.5 mg aluminum/m^3) for a mean of 12 years. Other studies also implicate aluminum as a cause of neurological impairment and neurophysical effects in exposed smelter workers and aluminum welders. A provisional inhalation RfC is based on the LOAEL of 4.6 mg aluminum/m^3 in the study of foundry workers described above. The lower end of the exposure concentration adjusted for intermittent exposure is 1.64 mg/m^3. Application of an uncertainty factor of 300 (factors of 10 each to estimate a NOAEL from a LOAEL and for interspecies extrapolation, and a factor of 3 to address deficiencies in the inhalation toxicity data base) yields an RfC of 5E-3 mg/m^3, which is equivalent to a chronic inhalation RfD of 1.4E-3 mg/kg-day. Confidence in the inhalation RfC is medium. The nervous system is the target organ for inhalation exposure to aluminum.

EPA (1997) provides no subchronic inhalation RfC for aluminum, nor can one be estimated from the key study used for the chronic RfC. Therefore, the chronic inhalation RfC of 5E-3 mg/m^3 (1.4E-3 mg/kg-day) is adopted as sufficiently protective for subchronic oral exposure.

6.0 Carcinogenicity Evaluation

EPA (2006) reviewed the human and laboratory animal data regarding the potential carcinogenicity of aluminum and concluded that the carcinogenicity cannot be determined. The human data are insufficient for drawing conclusions and the animal data are largely negative. Potency factors are not derived.

7.0 Toxicity Summary

Toxicity values for aluminum are summarized as follows:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1E+0	1E+0	NS	5E-3/ 1.4E-3	5E-3/ 1.4E-3	NS	D	ND	D	ND	ND
sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per										

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi

kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ or critical effect abbreviations: NS = nervous system.
[a]Dermal exposure is not evaluated.

8.0 References

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ANTIMONY (7440-36-0)

1.0 Introduction and Physical Properties

Antimony is a naturally occurring brittle **metal** that is not readily fabricated (ATSDR, 1992). It is alloyed with lead and other metals, imparting hardness, mechanical strength, corrosion resistance, electrochemical stability, and decreased coefficient of friction. Major applications include its use in grid metal in acid storage batteries, solder, sheet metal and pipe, bearing metal, castings, ammunition and type metal. Antimony trioxide is used as a fire retardant in plastics and textiles. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
121.75[a] (Element)	NA	NA	45[b]	NA	NA	NA	Note[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[b]Baes, C.F., R.D. Sharp, A.L. Sjoreen, R.W. Shor, 1984, ***A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture***, Health and Safety Division, Oak Ridge National Laboratory, ORNL-5786, September.
[c]Agency for Toxic Substances and Disease Registry (ATSDR), 1992, ***Toxicological Profile for Antimony***, U.S. Department of Health and Human Services, Atlanta, Georgia, December, on line.
Note 1: Solubility of antimony compounds varies from essentially insoluble to slightly soluble in water. The exception is antimony trichloride (6.0E+6 mg/L at 0°C).

2.0 Environmental Fate and Transport

Antimony is naturally present in the earth's crust and is released to the environment in windblown dust, from volcanic eruptions, sea spray, forest fires, and biogenic sources (HSDB, 2010). The majority of antimony released to the environment arises from anthropogenic sources, including nonferrous metal mining, smelting and refining, and the production, use and disposal of antimony alloys and compounds. Coal combustion and refuse and sludge combustion are other major anthropogenic sources of antimony.

The sorption and mobility of antimony released to soil is determined by the nature of the soil, the form of antimony deposited on the soil, and the pH (ATSDR, 1992; HSDB, 2010). Antimony is strongly sorbed to most soils. After prolonged leaching, the residual antimony appears to convert to a less mobile form, thereby reducing the potential for future leaching. This is reflected in the concentration versus depth profiles in contaminated soil; the concentration of antimony is highest in the surface layer of soil. Adsorption to soil correlates with the iron, manganese, and aluminum content of the soil with which it coprecipitates as hydroxylated oxides. Adsorption of antimony in soil is not correlated with organic carbon content, although this might be expected because of antimony's occurrence in anionic species. Leaching increases markedly at pH excursions above or below neutrality. There is little information on the forms of antimony in soil and the transformations that may occur in soil. During weathering, sulfitic minerals may be converted to oxides. Results of a sequential extraction study of soil at a smelter site showed that three-quarters of the antimony was in a residual form (extractable with aqua regia) and the rest of the antimony

was equally distributed among five more labile forms. At the control site, all of the antimony was in the five more labile forms.

Antimony released into waterways from natural weathering of soils and anthropogenic sources will be transported in streams and rivers and settle out in areas of active sedimentation; e.g., where a river empties into a bay (HSDB, 2010). Antimony appears to be strongly bound to sediment in association with iron, manganese, and aluminum hydroxyoxides. Antimony in the dissolved state in both fresh water and seawater is largely in the +5 oxidation state; the primary species is the anion $[Sb(OH)_6]^-$. A much smaller amount, predominantly in anaerobic waters, occurs in the +3 oxidation state, probably as the neutral species $Sb(OH)_3$. Thiocomplexes of Sb(III) may also occur in the anaerobic zone. Antimony can be reduced and methylated by microorganism in anaerobic sediment, releasing volatile methylated antimony compounds, which are both soluble and readily oxidized. Methylstibonic acid and dimethylstibonic acid have been found in seawater and estuarine water. In a study in the Baltic Sea these species constituted about 10 percent of dissolved antimony in the water column.

Antimony in the ambient air will exist entirely in particulate form or adsorbed to particulate matter (HSDB, 2010). It will be dispersed by the wind and removed from the atmosphere by gravitational settling, dry deposition, washout by rain (attachment to water droplets occurring within a cloud), and rainout (attachment to water droplets occurring below a cloud). The removal rate and distance traveled from the source will depend on source characteristics (e.g., stack height), particle size and density, and meteorological conditions. Gravitational settling governs the removal of large particles (>5 um), such as that associated with wind blown dust, whereas dry and wet deposition govern the removal of small particles. Large particles may have atmospheric half-lives of the order of hours, whereas very small particles may have atmospheric half-lives as long as 30 days.

Most anthropogenic emissions of antimony are from combustion processes. These emissions are primarily associated with small (submicron) particles, because antimony volatilizes during the combustion process and recondenses in the stack. A model that relates particle size to volatility estimates a mean atmospheric half-life for antimony of 1.9 days; for the more volatile antimony trioxide, the half-life is 3.2 days. The ratio of wet-to-dry deposition generally increases with decreasing particle size; therefore, a larger proportion of antimony will be found in rain compared with most other metals. A study of wet and dry deposition on an island in the German Bight far from anthropogenic sources found 87 percent of antimony dissolved in rain, 11 percent as particulate matter in rain, and only 2 percent as dry deposition.

Bioconcentration studies and field studies suggest that antimony does not bioconcentrate significantly in fish and aquatic organisms, and does not participate significantly in food-chain pathways (HSDB, 2010, EPA, 1995). Therefore, biotransfer factors are not developed for antimony.

3.0 Data for Evaluating Dermal Exposure

Estimates of the GI absorption of antimony tartrate and antimony trichloride by animals range from two to seven percent (ATSDR, 1992); ten percent is recommended as a reference value for humans for GI absorption of antimony tartrate. Although empirical data are lacking, one percent is recommend for other forms of antimony. The key study for development of the chronic oral

RfD used potassium antimony tartrate administered to rats and mice (EPA, 2010), for which EPA (2004) estimated a GI absorption efficiency of 15 percent. Therefore, the GAF of 15 percent (0.15) is chosen for this evaluation.

Data were not located regarding the extent of dermal uptake of antimony from soil. EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of antimony from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for antimony.

4.0 Noncancer Effects Evaluation

Acute intoxication from ingestion of large doses of antimony induces GI disturbances, dehydration and cardiac effects in humans (Iffland, 1988). Chronic oral exposure studies in laboratory animals include two briefly reported lifetime drinking water studies in rats and mice (EPA, 2003a). The only dose tested, 5 parts per million (ppm) potassium antimony tartrate, resulted in reduced longevity in both species, altered blood chemistry and reduced mean heart weight in the rats. EPA (2010) verified an RfD of 4E-4 mg/kg-day for chronic oral exposure to antimony from the LOAEL of 5 ppm potassium antimony tartrate (0.35 mg antimony/kg body weight-day) in the lifetime study in rats. An uncertainty factor of 1000 was applied; factors of 10 each for inter- and intraspecies variation and to estimate a no-observed-adverse-effect level (NOAEL) from a LOAEL. Confidence in the oral RfD is low. The heart is considered a likely target organ for chronic oral exposure of humans.

EPA (1997) adopted the verified chronic oral RfD of 4E-4 mg/kg-day as sufficiently protective for subchronic oral exposure.

EPA (2010) has not identified an RfC for antimony. EPA (2010) verified an RfC for antimony trioxide of 2E-4 mg/m^3.

5.0 Carcinogenicity Evaluation

Empirical data were not located regarding the carcinogenicity of antimony to humans. Antimony has not undergone a complete EPA (2010) evaluation for human carcinogenic potential.

6.0 Toxicity Summary

Toxicity values for antimony are summarized below. In addition to the EPA (2010) evaluation of oral exposure to antimony and inhalation exposure to antimony trioxide, EPA (1997) previously derived provisional chronic and subchronic oral RfDs for several specific antimony compounds. These RfDs were derived by analogy to antimony (i.e., the EPA [2010] evaluation) by assuming that toxicity was limited to the antimony moiety alone, and by correcting for differences in molecular weight. Ordinarily, antimony is not speciated when analyzed in environmental media, in which case the RfDs for antimony rather than the specific antimony compounds should be used. Nonetheless, the RfDs for the specific antimony compounds are included in the following table:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Antimony (not otherwise specified)										
4E-4	4E-4	H	ND	ND	NA	D	NA	D	NA	NA
Antimony Pentoxide										
5E-4	5E-4	H	ND	ND	NA	D	NA	D	NA	NA
Antimony Potassium Tartrate										
9E-4	9E-4	H	ND	ND	NA	D	NA	D	NA	NA
Antimony Tetroxide										
4E-4	4E-4	H	ND	ND	NA	D	NA	D	NA	NA
Antimony Trioxide										
4E-4	4E-4	H	ND	2E-4/ 5.7E-5[b]	Lu[b]	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ abbreviations: H = heart; Lu = lung.
[a]sRfDo and cRfDo should be adjusted by the GAF of 0.15 when used for dermal exposure.
[b]Applicable to antimony and all its compounds if it is assumed that all have similar effects following inhalation exposure.

7.0 References:

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ARSENIC (7440-38-2)

1.0 Introduction and Physical Properties

Arsenic is a natural **metalloid**, the 20th most abundant element in the earth's crust that occurs in both inorganic and organic forms (ATSDR, 2000; HSDB, 2010). Elemental arsenic is a steel-grey material that may occur naturally. However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Most inorganic and organic arsenic compounds are non-volatile, odorless and tasteless white or colorless powders. Inorganic arsenic occurs naturally in soil and in many kinds of rock, especially in minerals and ores that contain copper or lead. Inorganic arsenic is more toxic than organic forms. Major uses of arsenic in the U.S. include its incorporation into wood preservatives and other agricultural chemicals. It is also used as a metal in various electrical devices and is alloyed with lead and copper in the manufacture of lead bullets or shot (Lewis, 1997). Arsenic is also a component of the chemical warfare agent Lewisite (Opresko et al., 1998). Lewisite is manufactured by the condensation of arsenic trichloride with acetylene in the presence of aluminum, copper or mercuric chloride (Lewis, 1997). Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
74.92[a]	NA	NA	2.9E+1[b]	NA	NA	Note 1[c]	Note 2[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Variable: inorganic arsenic compounds are not likely to volatilize; some organic arsenic compounds are low-boiling liquids or gases at normal temperatures.
Note 2: Variable: inorganic arsenic compounds range from practically insoluble to freely miscible in water; most organic arsenic compounds are not readily soluble, most arsenic acid compounds are soluble to freely miscible.
[a] Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line, accessed 21 April.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***,, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.
[c]Agency for Toxic Substances and Disease Registry, (ATSDR), 2000, ***Update Toxicological Profile for Arsenic***, U.S. Public Health Service, Atlanta, Georgia, September, on line.

2.0 Environmental Fate and Transport

The production of arsenic and its use in nonferrous alloys and in the manufacture of semiconductors may result in its release to the environment through various waste streams HSDB, 2010). Other important anthropogenic releases are metal smelting, coal burning, and other industrial activities. Arsenic may be present at military sites as a result of training with or demilitarization or disposal of Lewisite. Most (approximately 80 percent) of anthropogenic releases are initially to soil (ATSDR, 2000).

Arsenic occurs in the air as a combination of trivalent and pentavalent forms almost entirely adsorbed to small particles that permit dispersion over long distances (ATSDR, 2000). Residence time in the atmosphere averages approximately nine days. Removal is largely by wet and dry deposition. Arsenic in surface water can undergo a variety of reactions and exist as several different soluble compounds. Sorption to sediment is often an important removal process, but biotransformation in sediment may return soluble forms to the water. Arsenic in soil generally exists as insoluble forms sorbed to clay or organic matter or complexed with calcium or iron.

Mobility is low and leaching is not generally significant, except that increasing soil pH can dramatically increase solubility and mobility.

Arsenic has been shown to bioconcentrate in aquatic organisms, mainly at the water-algae interface (ATSDR, 2000). There is no evidence for biomagnification through the various trophic levels, nor do there appear to be significant differences between bottom-feeders and predatory fish. Arsenic is among the metals listed as being of no concern for bioaccumulation in fish (EPA, 1995). Empirical data suggest that bioconcentration through terrestrial food chain pathways is unlikely to be significant (ATSDR, 2000). Therefore, biotransfer factors are not developed for arsenic.

3.0 Toxicokinetics

All forms of inorganic arsenic are readily absorbed by the lungs and GI tract; the extent of absorption is greater for more soluble compounds than for more insoluble compounds (ATSDR, 2000). Dermal absorption has not been well characterized but is significantly less than inhalation or oral absorption. GI and dermal absorption of arsenic from soil is much lower than from aqueous solution. Distribution is generally widespread throughout the body following absorption.

Metabolism of inorganic arsenic involves reduction of As^{+5} to As^{+3}, and oxidation of As^{+3} to As^{+5} so that arsenic is present systemically as a mixture of arsenate and arsenite (ATSDR, 2000). Arsenite is readily oxidized and methylated primarily in the liver to form the organic compounds monomethyl arsonic acid and dimethyl arsinic acid, which are rapidly excreted in the urine.

4.0 Dermal Exposure

EPA (2004) concluded that a GAF should not be estimated for the purpose of adjusting oral toxicity values for dermal exposure. Therefore, the oral toxicity values described below are used directly without adjustment for evaluating dermal exposure.

EPA (2004) cites empirical data indicating that dermal uptake of arsenic from soil approximates 3 percent. The ABS of 0.03 recommended by EPA (2004) is used herein. Empirical data regarding the uptake of soluble forms of arsenic from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for arsenic.

5.0 Noncancer Effects Evaluation

Inorganic arsenic may be an essential nutrient, at least for food-producing domestic animals, exerting beneficial effects on growth, health and feed conversion efficiency (Underwood, 1977). A lethal dose of arsenic trioxide in humans is 70-180 mg, approximately 50 to 140 mg arsenic (Ishinishi et al., 1986). Acute oral exposure of humans to high doses of arsenic produces liver swelling, skin lesions, disturbed heart function and neurological effects. The only noncancer effects in humans clearly attributable to chronic oral exposure to arsenic are dermal hyper pigmentation and keratosis, as revealed by studies of several hundred Chinese exposed to naturally occurring arsenic in well water (EPA, 2010). Similar effects were observed in persons exposed to high levels of arsenic in water in Utah and the northern part of Mexico. EPA (2010) verified an RfD of 3E-4 mg/kg-day for chronic oral exposure, based on a NOAEL of 8E-4 mg/kg-day for hyper pigmentation and kertatosis of the skin from the Chinese data. An uncertainty factor of 3 was applied. An increased incidence of Blackfoot disease was also observed, which may not be related to arsenic alone. Goyer (1991) describes black-foot disease

as a peripheral vascular disorder manifested as acrocyanosis and Raynaud's disease, which may progress to gangrene. EPA (2010) notes that the skin is the more sensitive target organ. Nonetheless, in keeping with EPA (1989) guidance regarding selection of target organ, both the skin and peripheral vascular system are selected as target organs for prolonged oral exposure to arsenic. Confidence in the RfD is medium.

The available data do not suggest a significant difference between chronic and subchronic exposure regarding the threshold for noncancer effects. Therefore, EPA (1997) adopted the chronic oral RfD as the provisional subchronic oral RfD for arsenic.

Occupational (predominantly inhalation) exposure is also associated with neurological deficits, anemia, and vascular effects (Ishinishi et al., 1986). However, concomitant exposure to other chemicals cannot be ruled out in the occupational studies. Therefore, the data are not sufficient for estimation of an inhalation RfC.

6.0 Carcinogenicity Evaluation

Inorganic arsenic is clearly a carcinogen in humans. Inhalation exposure is associated with increased risk of lung cancer in persons employed as smelter workers, in arsenical pesticide applicators, and in a population residing near a pesticide manufacturing plant (EPA, 2010). Oral exposure to high levels in well water is associated with increased risk of skin cancer and several forms of internal cancer, although the role of other chemicals in the internal cancers is unclear. Extensive animal testing with various forms of arsenic given by many routes of exposure to several species, however, has not demonstrated the carcinogenicity of arsenic, indicating that the common laboratory animals are not good models for carcinogenicity to humans. EPA (2010) classified inorganic arsenic in cancer weight-of-evidence Group A (human carcinogen), and recommended an oral SF of 1.5E+0 per mg/kg-day, based on the incidence of skin cancer in the Chinese study. EPA (200) noted that arsenic probably functions via several different mechanisms of toxicity not including direct interaction with DNA. These appear to obey thresholds or to generate a non-linear slope that approaches 0 in the low-dose range. The SF probably exaggerates cancer risk in the low dose range associated with most environmental exposures, although the extent is unclear.

An inhalation URF of 4.3E-3 per $\mu g/m^3$, equivalent to an inhalation SF of 1.5E+1 per mg/kg-day, was derived for inorganic arsenic from the incidence of lung cancer in occupationally exposed men (EPA, 2010).

7.0 Toxicity Summary

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
3E-4	3E-4	S, PVS	ND	ND	NA	A	1.5E+0	A	4.3E-3	1.5E+1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
data; NA = not applicable. Target organ or critical effect abbreviations: S = skin; PVS = peripheral vascular system. [a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.										

8.0 References

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U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

BERYLLIUM

Beryllium is a naturally occurring **metal**, which is used in its pure state or as alloys in a wide variety of electrical components, tools, optical components, precision instruments, structural components of aircraft, missiles and satellites, and other metal-fabricating applications (ATSDR, 2000; HSDB, 2010. Beryllium oxide is used in high-technology ceramics, electronic heat sinks, and several refractory applications. Relevant physical properties are compiled below:

MW (g/mole)	log K_{ow} (unitless)	H (atm-m^3/mole)	K_d (L/kg)	D_a (cm^2/s)	D_w (cm^2/s)	VP (atm)	S (mg/L)
9.01[a] (element)	NA	NA	7.9E+2[b]	NA	NA	ND	Note 1[c]

NA = not applicable, ND = no data.
Note 1: Beryllium chloride (typical soluble salt): very soluble.
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[b]U.S. Environmental Protection Agency (EPA), 2002 ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.
[c]Agency for Toxic Substances and Disease Registry, (ATSDR), 2000, ***Update Toxicological Profile for Beryllium***, U.S. Public Health Service, Atlanta, Georgia, September, on line.

Although beryllium is a naturally occurring metal, the predominant release to the atmosphere is emissions from fossil fuel combustion, particularly coal (ATSDR, 2000; HSDB, 2010). Beryllium production and use in alloys, microelectronics, aerospace technology, as a solid-propellant in rocket fuels, in aircraft brakes, X-ray windows, and neutron reflectors contribute small amounts to the environment. Beryllium exists in air as particulates that are subject to wet and dry deposition. Smaller particles may travel large distances before removal from the air.

Deposition from the atmosphere and waste disposal contributes beryllium to soil (ATSDR, 2000; HSDB, 2010). Beryllium is expected to be essentially immobile in soil regardless of pH or the presence or absence of specific soil constituents; therefore, leaching to groundwater is not expected to be significant. Beryllium in surface water tends to form insoluble beryllium hydroxide or sorb to suspended mineral solids and sediments in water; very little beryllium exists in a soluble form.

Beryllium is not expected to bioconcentrate or reach significance in aquatic or terrestrial chain pathways (ATSDR, 2000). Therefore, biotransfer factors for beryllium are not compiled. A GAF of 0.01 is chosen for this evaluation (EPA, 2004).

Data were not located regarding the extent of dermal uptake of beryllium from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of beryllium from water were

not located. The EPA (2004) default PC for inorganic chemicals of 1E-3 cm/hour is selected for beryllium.

A (172-week) dietary study in dogs identified GI lesions as the critical effect of chronic ingestion exposure to beryllium (EPA, 2010). A verified chronic oral RfD of 2E-3 mg/kg-day was based on a BMD_{10} (statistical estimate of a dose level associated with a 10 percent dose rate) of 4.6E-1 mg/kg-day in the dog study. An uncertainty factor of 300 was applied. Confidence in the RfD is low to medium. The GI tract is the target organ for chronic oral exposure.

Occupational exposure is associated with dermatitis, acute pneumonitis and chronic pulmonary granulomatosis (Reeves, 1986), also known as berylliosis or chronic beryllium disease. Berylliosis has also been observed in humans living in the vicinity of a beryllium plant. Similar pulmonary effects were observed in laboratory animals subjected to inhalation exposure. A verified chronic inhalation RfC of 2E-2 mg/m^3 was based on a LOAEL of 2.0E-1 μg/m^3 in an occupational study, and a NOAEL of 1.0E-2 to 1.0E-1 μg/m^3 in a community exposure study (EPA, 2010). The critical endpoint is beryllium sensitization and progression to berylliosis. An uncertainty factor of 10 was used. The target organ for inhalation exposure to airborne beryllium is the lung. Confidence in the inhalation RfC is medium. The RfC is equivalent to a chronic inhalation RfD of 5.7E-6 mg/kg-day.

EPA (2010) classified beryllium in cancer weight-of-evidence Group B1 (probable human carcinogen) based on limited human (occupational) cancer data and sufficient animal data. A significant increase in lung tumors occurred in rats and in rhesus monkeys subjected to inhalation exposure or intratracheal instillation of a variety of beryllium compounds. Osteogenic sarcomas were induced in rabbits and mice, but not in rats or guinea pigs, injected intravenously with various beryllium compounds. A verified inhalation URF of 2.4E-3 per μg/m^3 equivalent to an SF of 8.4E+0 per mg/kg-day was derived from an occupational study. The B1 classification applies only to inhalation exposure. Oral studies in animals yielded inconclusive results. EPA (2010) concluded that the potential carcinogenicity of oral exposure of humans to beryllium cannot be determined.

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U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

CADMIUM (7440-43-9)

1.0 Introduction and Physical Properties

Cadmium is a metal naturally present in the earth's crust at low concentrations. It occurs frequently with zinc and lead in sulfide ores (Friberg et al., 1986). Cadmium is used in electroplating, alloys, photoelectric cells, storage batteries, ceramics, paints, the nuclear industry, photography, plastics, and, formerly, as a fungicide (ATSDR, 1999). Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
112.41[a] (Element)	NA	NA	7.5E+1[b]	NA	NA	NA	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Cadmium chloride (typical soluble salt): freely soluble.
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 1999, ***Update Toxicological Profile for Cadmium***, U.S. Public Health Service, Atlanta, Georgia, July, on line.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Final, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.

2.0 Environmental Fate and Transport

Anthropogenic releases to the environment include mining and smelting, fuel combustion, disposal of cadmium-containing products, manufacture or application to soil of phosphate fertilizer, application of sewage sludges, industrial uses, waste incineration, and fossil fuel combustion (ATSDR, 1999). Cadmium in the air exists in the form of small particulates that are subject to long distance transport. Wet deposition is the main removal process. Cadmium may exist in surface water largely as soluble salts. It may also form sparingly soluble salts and complex with humic material and eventually be deposited in the sediment, but alterations in redox potential, pH or salinity may cause release from sediment. Cadmium does not sorb strongly to soil constituents and may leach into water, particularly under acidic conditions.

Cadmium has been shown to bioaccumulate in aquatic and terrestrial food chains (ATSDR, 1999). Rapidly growing plants such as the water hyacinth have been proposed as a remedial mechanism to remove cadmium from domestic and industrial effluents. However, bioaccumulation in fin fish is not expected to be significant (ATSDR, 1999). Biotransfer factors for cadmium are compiled below:

BCF	Bpr	Bpv	Bb	Bm
NA	6.20E-2[a]	3.64E-1[a]	1.20E-4[a]	6.50E-6[a]

BCF = bioconcentration factor, L/kg; Bpr = soil-to-plant (reproductive portions) biotransfer factor, unitless; Bpv = soil-to-plant (vegetative portions) biotransfer factor, unitless; Bb = soil-

BCF	Bpr	Bpv	Bb	Bm
to-beef biotransfer factor, days/kg; Bm = soil-to-milk biotransfer factor, days/kg. [a]U.S. Environmental Protection Agency (EPA), 1998, ***Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume Two***, Peer Review Draft, Office of Solid Waste and Emergency Response, Washington, DC, EPA530-D-98-001B, July.				

3.0 Data for Evaluating Dermal Exposure

GI absorption of ingested cadmium is ordinarily 5 to 8%, but may reach 20% in cases of serious dietary iron deficiency (Friberg et al., 1986). The GAF of 0.025 assumed for uptake of cadmium from food (EPA, 2010, 2004) is used for development of the dermal RfD. The ABS of 1E-3, based on empirical data (EPA, 2004), is used for dermal uptake from soil or sediment. The EPA (2004) recommended K_p of 1.1E-3 cm/hour for cadmium compounds based on empirical data for cadmium chloride is selected for this evaluation.

4.0 Noncancer Effects Evaluation

Acute inhalation exposure to fumes or particles of cadmium induces respiratory symptoms, general weakness, and, in severe cases, respiratory insufficiency, shock and death (Friberg et al., 1986). Acute oral exposure induces gastrointestinal disturbances. Chronic inhalation exposure induces pulmonary emphysema, and chronic exposure by either inhalation or oral exposure consistently produces renal tubular disease in humans and laboratory animals. Proteinuria is a reliable early indicator of cadmium-induced kidney disease. The combination of pulmonary emphysema and renal tubular disease, if severe, may result in early mortality. Painful osteomalacia and osteoporosis may arise from altered metabolism of bone minerals secondary to renal damage. The combination of renal and skeletal damage is called *itai-itai* (“ouch-ouch") disease in Japan. Cadmium exposure is associated also with liver damage, but the liver appears to be less sensitive than the kidney. The kidney tubule is the primary target organ of cadmium toxicity. Free cadmium ions may interfere with the subcellular enzymatic processes of the renal tubular cells (ATSDR, 1999). EPA (2010) verified chronic oral RfD values of 5E-4 mg/kg-day for cadmium ingested in water and 1E-3 mg/kg-day for cadmium ingested in food, based on a toxicokinetic model that predicts NOAELs from renal cortical concentrations of cadmium and an uncertainty factor of 10. The different RfD values reflect assumed differences in GI absorption of cadmium from water (5 percent) and food (2.5 percent). The RfD of 1E-3 mg/kg-day is used for all solid media and food-chain pathways, and serves as the basis for development of the dermal RfD. The RfD of 5E-4 mg/kg-day is used only for water ingestion. Confidence in the oral RfD values is high.

No subchronic oral RfDs were located for exposure to cadmium. Therefore, the chronic oral RfD of 1E-3 for all solid media and food-chain pathways, and 5E-4 for water ingestion is adopted as sufficiently protective for subchronic exposure as well.

No verified RfC is listed on IRIS. ATSDR (2008) lists a chronic inhalation minimal risk level (MRL) of 1E-5 mg/m^3. This MRL was modeled from occupational studies, based on the air concentration (combined with other sources) that would result in a 10 percent increase in β2-microglobulin proteinuria expressed as µg/g urinary cadmium in creatinine. This urinary cadmium concentration corresponds to 1.35 µg/g creatinine. The lower 95 percent confidence limit on this value is 0.5 µg/g (cadmium/creatinine). The environmental model predicted that 0.1

1E-4 µg/m^3 cadmium oxide, combined with a dietary cadmium intake of 3E-4 mg/kg-day, would result in a urinary cadmium level of 0.4 µg/g creatinine. An uncertainty factor of 3 was used to account for human variability and a modifying factor of 3 was used because of inadequacies in the database (ATSDR, 2008). No subchronic RfC was identified; the chronic RfC is assumed to be adequately protective subchronic exposure.

5.0 Carcinogenicity Evaluation

Carcinogenicity data in humans consist of several occupational studies that associate cadmium exposure with lung cancer, but concomitant exposure to other carcinogenic chemicals and smoking were not adequately controlled (EPA, 2010). Other occupational studies reported significantly increased risk of prostatic cancer, but this effect was not observed in the largest occupational study of workers exposed to high levels. The animal data consist of an inhalation study in rats that showed a significant increase in lung tumors, and several parenteral injection studies that produced injection site tumors. The EPA (2010) classified cadmium a cancer weight-of-evidence Group B1 substance for inhalation exposure on the basis of limited evidence of carcinogenicity in humans and sufficient evidence in animals. EPA (2010) concluded that no positive studies suitable for quantitation were identified for oral administration. EPA (2010) derived an inhalation URF of 1.8E-3 per µg/m^3, equivalent to an SF of 6.3E+0 per mg/kg-day, from an occupational exposure study.

6.0 Toxicity Summary

Toxicity values for cadmium are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1E-3[a,b]/ 5E-4[c]	1E-3[a,b]/ 5E-4[c]	K	1E-5/ 2.9E-6	1E-5/ 2.9E-6	K	ND	ND	B1	1.8E-3	6.3E+0

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ abbreviations: K = kidney.
[a]Solid media and food-chain pathways
[b]sRfDo and cRfDo should be adjusted for GI absorption by the GAF of 0.025 when used for dermal exposure. Adjusted values are appropriate for dermal exposure to soil or water.
[c]Water ingestion.

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CHROMIUM (7440-47-3)

1.0 Introduction and Physical Properties

Chromium is a naturally occurring **metal** (ATSDR, 2000). It occurs in several valence states; chromium (III) (16065-83-1) and chromium (VI) (18540-29-9) are the forms most commonly encountered in environmental media. Chromium is used largely in the metallurgical, refractory and chemical industries. The largest amount is used in the metallurgical industry in various steels and nonferrous alloys. The second largest use is by the chemical industry in pigments, metal finishing, leather tanning and wood treatment. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
52.00[a] (element)	NA	NA	1.8E+6 (CrIII) 1.9E+1 (CrVI)[b]	NA	NA	ND	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Chromium compounds vary from insoluble to highly soluble.
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 2000, ***Toxicological Profile for Chromium***, U.S. Public Health Service, Atlanta, Georgia, September, on line.
U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

2.0 Environmental Fate and Transport

Chromium is released into the atmosphere from natural gas, oil and coal combustion, and from use by the industries mentioned above (ATSDR, 2000). Other sources include wind transport from road dust, cement producing plants, the wearing down of asbestos brake linings from automobiles, incineration of municipal refuse and sewage sludge, exhaust emission from automotive catalytic converters, and emissions from cooling towers that use chromium compounds as rust inhibitors. Significant quantities of chromium are released to surface water from industrial use. Land disposal of chromium-containing commercial products, solid waste and slag from chromate manufacture, and coal ash, primarily from electric utilities and other operations that burn coal, are the major releases to soil.

Chromium releases from combustion processes and ore processing are generally in the form of chromium (III) oxide; however, chromium (VI) has been identified in fly ash from coal combustion at chromate manufacturing and user sites (ATSDR, 2000). Airborne chromium exists in particulate form that may travel great distances from the point of emissions; wet and dry deposition account for the majority of removal from air.

Most chromium released to surface water eventually adsorbs to particles and becomes deposited in bottom sediment, but small quantities may remain in the water in both soluble and insoluble forms (ATSDR, 2000). The soluble forms are usually chromium (VI) salts and soluble chromium (III) compounds. Chromium (VI) may be found in water, but eventually organic matter and other reducing agents will reduce chromium (VI) to chromium (III). Chromium in soil is present

mainly as insoluble chromium (III) carbonates and oxides that are unlikely to be mobile to any significant extent. However, soluble forms may also be present, depending on the form of the chemical released, that may be quite mobile in soil. Also, lower pH facilitates complexation with organic matter and increases mobility.

Empirical evidence suggests that chromium is unlikely to participate significantly in food chain pathways (ATSDR, 2000; EPA, 1995); therefore, biotransfer factors are not compiled.

3.0 Toxicokinetics

Identification of chromium in urine, serum and tissues of occupationally exposed humans confirms that soluble chromium (III) and chromium (VI) compounds are absorbed from the lung (ATSDR, 2000). The rate of absorption, however, depends largely on the physical and chemical characteristics of the chromium compound involved, as shown in numerous animal inhalation studies. Chromium (VI) compounds are more readily absorbed because the chromate anion participates in facilitated diffusion mechanisms not available to chromium (III).

Absorption of dietary sources of chromium from the GI tract in humans ranges from approximately 0.5 to 2 percent, as inferred from urinary excretion data (ATSDR, 2000). The extent of absorption appears to be inversely related to dietary chromium content. A review of several studies suggests that 0.4 to 14.5 percent of orally administered chromium not related to dietary sources is absorbed by the GI tract of humans, but valence and chemical form and nutritional status (fed vs. fasting) appear to influence efficiency of absorption (ATSDR, 2000). Chromium (VI) sources are more efficiently absorbed than chromium (III) sources as described above for inhalation exposure. Experiments with laboratory animals showed that the stomach has the ability to reduce chromium (VI) to chromium (III), reducing the extent of absorption when chromium (VI) compounds were administered *per os* compared with injection directly into the jejunum.

Both chromium (III) and chromium (VI) can penetrate intact human skin, and dermal uptake is increased if the skin is damaged (ATSDR, 2000). In some cases, dermal uptake was sufficient to result in signs of toxicity. The form and the vehicle greatly influence the rate of dermal uptake.

Inhaled particles of chromium compounds can remain in the lungs for years (ATSDR, 2000). Chromium absorbed into the blood is distributed throughout the body with highest levels frequently located in the kidneys. Chromium has been shown to cross the placenta and to be excreted via lactation. Autopsy studies in the US show that highest concentrations in newborns occur in the kidney, liver, aorta, heart, pancreas and spleen, and that tissue levels decline with age.

The main feature of the metabolism of chromium involves reduction of chromium (VI) to chromium (III) via the formation of chromium (V) and chromium (IV) intermediates (ATSDR, 2000). Reduction of chromium (VI) to chromium (III) occurs in the acid milieu of the stomach, primarily by reaction with ascorbate. Ascorbate, glutathione and other substrates effectively reduce absorbed chromium (VI) to chromium (III). Chromium (III) is considered a nutritionally essential element required for the proper metabolism of glucose, proteins and lipids. It acts as part of a complex known as GTF, which facilitates the action of insulin. Although chromium (III) complexes are generally thought to be inert, there is recent evidence that chromium (III)

may be reduced to chromium (II), which could catalyze the Haber-Weiss reaction resulting in the production of genotoxic hydroxyl radicals.

Absorbed chromium is excreted primarily in the urine (ATSDR, 2000).

4.0 Dermal Exposure

EPA (2004a) recommends GAFs of 0.013 for chromium (III) and 0.025 for chromium (VI), generally consistent with the toxicokinetic data reviewed above, which are used in this evaluation. The GAF of 0.013 for chromium (III) should be used for total chromium, which is assumed to consist of 6 parts of chromium (III) to 1 part of chromium (VI) (EPA, 2004b, 2010).

Data were not located regarding the extent of dermal uptake of chromium from soil, and EPA (2004a) provides no estimate of the extent of dermal absorption (ABS). EPA (2004a) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. EPA (2004a) compiled *in vivo* and *in vitro* data from human experiments of dermal uptake of chromium from water. Average K_p values of 1E-4 cm/hour and 1E-3 cm/hour are estimated for chromium (III) and chromium (VI), respectively. The K_p of 1E-4 cm/hour for chromium (III) should be used for total chromium as explained above.

5.0 Noncancer Effects Evaluation

As mentioned above, chromium (III) is an essential nutrient involved in maintenance of normal metabolism (ATSDR, 2000). EPA (2010) verified an RfD of 1.5E+0 mg/kg-day for chronic oral exposure to chromium (III) by applying an uncertainty factor of 1000 to a NOEL of 1800 g/kg (1.468 mg/kg body weight/day) as an average total ingested dose in a dietary study in which rats were given 600 feedings of chromic oxide baked into bread. No other dose levels were tested. Confidence in the RfD is low. No target organ or critical effect was identified for the toxicity of oral exposure to chromium (III).

The available data do not suggest a significant difference between chronic and subchronic exposure regarding the threshold for the noncancer effects of chromium (III). Therefore, EPA (1997) adopted the verified chronic oral RfD, which at the time was listed on IRIS as 1E+0 mg/kg-day, as the provisional subchronic oral RfD for chromium (III). Subsequently, EPA (2010) recalculated the average daily dose, which led to revising the chronic oral RfD from 1E+0 to 1.5E+0 mg/kg-day. Since the only change between the earlier and the present verified oral RfD reflects a recalculation, it is recommended that the current verified chronic oral RfD of 1.5E+0 mg/kg-day should also be used for subchronic exposure.

EPA (2010) verified an RfD for chronic oral exposure to chromium (VI) of 3E-3 mg/kg-day based on a NOAEL of 25 mg/L (2.5 mg/kg-day) in the drinking water of rats exposed for one year. An overall uncertainty factor of 900 was applied. The uncertainty factor consists of factors of 10 each for inter- and intra-species variation, a factor of 3 to expand from subchronic to chronic exposure, and a modifying factor of 3 to address concerns that relatively low levels may induce GI effects and possibly some forms of cancer in humans. Inclusion of the modifying factor of 3 was a relatively recent (1998) revision to a previously verified derivation. Nonetheless, EPA (2010) notes that confidence in the chronic oral RfD is low.

EPA (1997) presented a provisional subchronic oral RfD of 2E-2 mg/kg-day for chromium (VI) based on the same drinking water study and an uncertainty factor of 200 (not otherwise explained). Presumably, this derivation reflects the earlier IRIS evaluation before inclusion of the modifying factor of 3. However, the concern for GI effects that gave rise to the modifying factor could apply to subchronic as well as chronic exposure. Therefore, it is recommended that a new preliminary subchronic oral RfD should be calculated for chromium (VI). This is done by applying an overall uncertainty factor of 300 to the NOAEL of 2.5 mg/kg-day from the drinking water study. The uncertainty factor of 300 reflects the overall uncertainty factor of 900 used for the chronic RfD without the factor of 3 to expand from subchronic to chronic exposure. The preliminary subchronic oral RfD for chromium (VI) so calculated is 8E-3 mg/kg-day.

The data summarized by EPA (2010) are insufficient to identify a mechanism of toxicity or target organ(s) for chronic oral exposure to chromium (VI). Data from other sources, however, are sufficient to identify potential target organs. Goyer (1991) reported that renal tubular necrosis is the major effect in humans from ingestion of chromium compounds. The context, however, suggests that this effect is associated with acute exposure to high doses (e.g., accidental or attempted suicide ingestion); therefore, the kidney may not be an acceptable candidate as a target organ for chronic oral exposure. Furthermore, a review of human and animal studies by EPA (1998a) did not implicate the kidney as a target organ for chronic oral exposure. EPA (1998a), however, reported GI effects in a cohort of 155 Chinese villagers who consumed water from a well located adjacent to a chromium alloy plant. Symptoms included oral ulcers, diarrhea, abdominal pain, indigestion, and leukocytosis with a left shift. The dose rate of chromium (VI) was estimated at 0.57 mg/kg-day, nearly 200 times the oral RfD. It is likely that the GI symptoms reflect the irritant nature of chromium (VI).

EPA (1998a) also reviewed several reproductive studies. An early and inadequately conducted study reported no effects in rats fed a diet containing 0.125 percent K_2CrO_4. A diet containing 0.25 percent resulted in “subnormal condition” (including rough coat) and “subnormal” offspring; a diet containing 0.5 percent resulted in diarrhea and sterility. Assuming rats consume food equivalent to 5 percent of their body weight each day (EPA, 1980), dietary levels of 0.125, 0.25 and 0.5 percent correspond to chromium (VI) dose rates of 17, 33, and 67 mg/kg-day, respectively. Drinking water studies consistently report developmental effects and impaired reproduction in rats and mice ingesting approximately 20 mg chromium (VI)/kg-day. A well controlled study reported slightly decreased erythrocyte size and hemoglobin content in rats and mice of either sex fed diets containing 400 ppm potassium chromate. The effects were interpreted as “suggestive of a potential bone marrow/erythroid response.” The 400 ppm diet is equivalent to chromium (VI) dose rates of 6.4 mg/kg-day in rats (EPA, 1998a) and approximately 11 mg/kg-day in mice, assuming that mice consume food equivalent to 10 percent of their body weight/day (EPA, 1980). In addition, cytoplasmic vacuolization of hepatocytes was observed in mice fed diets containing 50, 100 or 400 ppm potassium chromate, but it is not clear if either the incidence or intensity occurred in a dose-related manner. The 50 ppm diet, the lowest associated with hepatocellular vacuolization, is equivalent to a chromium (VI) intake rate of approximately 1.3 mg/kg-day. A subsequent study reported decreased erythrocyte hemoglobin content in female mice fed a diet containing 100 ppm potassium chromate, equivalent to a chromium (VI) dose rate of 6.0 mg/kg-day.

The GI signs reported in humans are clearly an indication of adverse effects; therefore, the GI tract is selected as a target organ. The mechanism of toxicity is assumed to be the irritation

induced by tissue contact with chromium (VI). The slight hematologic changes observed in rats and mice and the hepatocellular vacuolization observed in mice do not appear to be sufficiently threatening to be considered adverse. Therefore, target organs selected for chronic oral exposure to chromium (VI) include the GI tract, unborn child (fetus), and reproductive system.

Inhalation (occupational) exposure to chromium may induce respiratory symptoms, changes in lung function and irritation, erosion or perforation of the nasal septum, depending in part on the exposure level (EPA, 2010). No adverse effects were observed in workers exposed to 1E-3 mg/m^3 for 0.2 to 23.6 years (average 2.5 years). EPA (1998b, 2010) reviewed several human and animal studies, and determined that effects observed from inhalation exposure to chromium (VI) are not relevant to exposure to chromium (III). EPA (1998c) concluded that chromium (VI) is the only form of chromium of concern for inhalation exposure.

EPA (2010) developed separate chronic inhalation RfC values for human exposure to chromic acid mists and dissolved chromium (VI) aerosols, and for exposure to chromium (VI) particulates. A verified chronic inhalation RfC of 8E-6 mg/m^3 for chromic acid mists and dissolved chromium (VI) aerosols is based on an adjusted LOAEL of 7.14E-4 mg/m^3 associated with atrophy of the nasal septum in subchronically occupationally exposed humans. An overall uncertainty factor of 90 was used, consisting of factors of 10 for intraspecies variation, 3 to estimate a NOAEL from a LOAEL, and 3 to expand from subchronic to chronic exposure. Confidence in the inhalation RfC is low. The upper respiratory tract is considered the target organ for inhalation exposure to chromic acid mists and dissolved chromium (VI) aerosols. The chronic inhalation RfC is equivalent to a chronic inhalation RfD of 2.3E-6 mg/kg-day.

Inhalation exposure to chromium (VI) particulates is associated with pneumocyte toxicity; i.e., with effects on the lungs themselves. EPA (2010) derived an RfC of 1E-4 mg/m^3 for chronic inhalation exposure to chromium (VI) particulates from an adjusted benchmark concentration of 3.4E-2 mg/m^3 associated with altered enzyme activity in bronchioalveolar lavage fluid from rats exposed to sodium dichromate dust intermittently for up to 90 days. An uncertainty factor of 300 was used, consisting of a factor of 10 to provide additional protection to unusually sensitive individuals, and factors of 3 each to cover for physiologic differences between rats and humans, and to expand from subchronic to chronic exposure. Confidence in the RfC is medium. The RfC is equivalent to a chronic inhalation RfD of 2.9E-5 mg/kg-day. The lung is considered to be the target organ for chronic inhalation exposure to chromium (VI) particulates.

No current EPA-derived subchronic inhalation evaluation exists for chromic acid mists and dissolved chromium (VI) aerosols. However, a preliminary subchronic inhalation RfC can be derived by excluding the uncertainty factor of 3 for expanding from subchronic to chronic exposure. Application of the remaining overall uncertainty factor of 30 to the adjusted LOAEL of 7.14E-4 mg/m^3 yields a preliminary subchronic inhalation RfC of 2E-5 mg/m^3 for chromic acid mists and dissolved chromium (VI) aerosols. The preliminary subchronic inhalation RfC is equivalent to a subchronic inhalation RfD of 6.8E-6 mg/kg-day.

No current EPA-derived subchronic inhalation evaluation exists for chromium (VI) particulates. However, a preliminary subchronic inhalation RfC can be derived by excluding the uncertainty factor of 3 for expanding from subchronic to chronic exposure. Application of the remaining overall uncertainty factor of 100 to the adjusted LOAEL benchmark concentration of 3.4E-2 mg/m^3 yields a preliminary subchronic inhalation RfC of 3E-4 mg/m^3 for chromium (VI)

particulates. The preliminary subchronic inhalation RfC is equivalent to a subchronic inhalation RfD of 9.7E-5 mg/kg-day.

EPA (1998c) noted that exposure to chromic acid mists and dissolved chromium (VI) aerosols is likely to be restricted to occupational settings and that most environmental exposures would involve exposure to chromium (VI) particulates. Therefore, the chronic inhalation RfC and RfD for chromium particulates will be used in this evaluation.

6.0 Carcinogenicity Evaluation

EPA (2010) classified chromium (III) in cancer weight-of-evidence group D – not classified as to carcinogenicity to humans – because of inadequate data. Chromium (VI) is classified in cancer weight-of-evidence group A – known human carcinogen – based on the consistent finding of lung cancer in epidemiologic studies of occupationally exposed workers in chromate production and the chrome pigment industry (EPA, 2010). Conclusions regarding the human data are corroborated by data from animal experiments. There is no evidence that oral exposure to chromium (VI) induces cancer, and EPA (2010) assigned chromium (VI) to Group D for oral exposure.

An inhalation URF of 1.2E-2 per ug/m^3, equivalent to an inhalation SF of 4.2E+1 per mg/kg-day, was based on increased risk of lung cancer deaths in chromate production workers (EPA, 2010). It should be noted that the quantitative assessment is based on the concentration of total chromium to which the workers were exposed, including insoluble (trivalent) and soluble (hexavalent) forms. It was assumed that chromium (VI) constituted not less than one-seventh of the total chromium; i.e., a ratio of 1 part of chromium (VI) to 6 parts of chromium (III). However, the forms of chromium in the air were not identified, and chromium (VI) may have constituted a significantly much greater portion of total airborne chromium. EPA (200) presented the URF of 1.2E-2 per ug/m^3 as a verified potency estimate for chromium (VI), but noted that this estimate may underestimate the potency of exposure to pure chromium (VI) by as much as seven-fold.

7.0 Toxicity Summary

Toxicity values for chromium (III) and chromium (VI) are summarized below. Theoretical noncancer toxicity values are calculated for total chromium assuming a chromium (III)/chromium (VI) ratio of 6 to 1. Note that the URF is based on a mixture of chromium (III) and chromium (VI).

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Chromium (III)										
1.5E+0	1.5E+0	ND	ND	ND	NA	D	ND	D	ND	ND
Chromium (VI)[b]										
8E-3	3E-3	GI, F, Re	3E-4/ 9.7E-5	1E-4/ 2.9E-5	Lu	D	ND	A	1.2E-2	4.2E+1
Total Chromium[c]										
NA	2.1E-2	GI, F, Re	NA	7E-4/ 2.0E-4	Lu	D	ND	A	1.2E-2	4.2E+1
sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference										

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi

concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: GI = gastrointestinal tract, F = unborn child (fetus), Re = reproductive system, Lu = lung.
[a]sRfDo and cRfDo should be adjusted by the appropriate GAF values described above when used for dermal exposure.
[b]Inhalation RfC/RfD values listed are those for chromium (VI) particulates. Values for chromic acid mists and dissolved chromium (VI) aerosols are not relevant to environmental exposures.
[c]For noncancer effects is based on the assumption that total chromium consists of 1 part of chromium (VI) and 6 parts of chromium (III); note that the URF assumed a mixture of chromium (III) to chromium (VI) at a ratio of approximately 6:1 (EPA 2010; EPA, 2004b).

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COBALT (7440-48-4)

1.0 Introduction and Physical Properties

Cobalt is a relatively scarce **metal**, constituting about 0.001 percent of the earth's crust (Elinder and Friberg, 1986). It often occurs in association with nickel, silver, lead, copper and iron ores. Cobalt is used in forming special metal alloys with unusual and useful properties (ATSDR, 2004; HSDB, 2010). It is also used in cutting materials, lacquers, varnishes, paint driers, enamels, inks, glazes, glass manufacture, as a catalyst in petroleum refining, and as a supplement in animal and human nutrition. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
58.93[a]	NA	NA	45[b]	NA	NA	ND	Note 1[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Cobaltous chloride as a typical cobalt salt: soluble.
[a]Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line.
[b]Baes, C.F., R.D. Sharp, H. Sjoreen, and R.W. Shor, ***A Review and Analysis for Assessing Transport of Environmentally Released Radionuclides through Agriculture, ORNL-5786, Oak Ridge National Laboratory*** .
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2.0 Environmental Fate and Transport

Cobalt is released to the environment, particularly to the air, largely from industrial processes that involve grinding or polishing hard metal devices that contain cobalt (HSDB, 2010). Other anthropogenic sources include fossil fuel burning, vehicular and aircraft exhaust, production and use of cobalt-containing alloys and chemicals, copper and nickel smelting and refining, disposal of sewage sludge, and application of fertilizers derived from phosphate rock (ATSDR, 2004). Natural sources include soil and soil dust, seawater spray, and volcanic eruptions. Natural releases to the atmosphere slightly exceed anthropogenic releases.

Ionic cobalt compounds exist in the particulate phase in air and these compounds may be removed from the air by wet and dry deposition (HSDB, 2010).

HSDB (2010) reports that K_d values for cobalt range from 0.2 to 3,800 L/kg. The value of 45 L/kg presented above appears to be a reasonable intermediate point. Soils with higher pH and content of clay, natural organics, and hydrous manganese and iron oxides, bind cobalt to a greater degree; as these factors decrease, the mobility of cobalt increases. Microbial activity may increase the solubility of cobalt in soil. Chelating agents increase the solubility of cobalt and enhance its mobility in soil. Cobalt compounds do not volatilize from moist or dry soil surfaces due to their ionic character.

The transport and speciation of cobalt in natural waters and sediments is complicated by many factors (HSDB, 2010). The presence of sewage-derived organics appears to enhance the solubility of cobalt in freshwater by forming soluble complexes. Cobalt exists in the +2 or +3 oxidation state for the majority of its compounds and complexes. Volatilization from water surfaces is not expected, due to the ionic nature of dissolved cobalt compounds.

A few plant species are known to accumulate cobalt; however, translocation to aerial parts is generally insignificant (ATSDR, 2004; HSDB, 2010). Cobalt is bioaccumulated by aquatic organisms, particularly at the lower trophic levels. Biomagnification, however, does not occur and cobalt localizes in the viscera and on the skin, rather than in edible tissues. Therefore, cobalt is not expected to impact human health through the food-chain pathways and biotransfer factors are not provided.

3.0 Toxicokinetics

Inhaled cobalt particles deposit in the upper or lower respiratory tract, depending largely on particulate size (ATSDR, 2004). Uptake may occur by dissolution or phagocytosis; larger particles are removed by ciliary clearance. The extent of pulmonary uptake depends largely on particle size distribution.

GI absorption of ingested cobalt in humans ranges from 18 to 97 percent, depending on the form and dose, and on the nutritional status of the subjects (ATSDR, 2004). Cobalt is absorbed more efficiently in cases of iron deficiency. Animal studies show that soluble forms such as cobalt chloride are absorbed to a much greater extent (13 to 34 percent) than insoluble cobalt oxide (1 to 3 percent).

Experiments with humans indicate that cobalt in hard metal dust can be absorbed through the skin, although the rate or extent of uptake were not quantified (ATSDR, 2004). Experiments in animals indicate that cobalt is absorbed much more efficiently through abraded than intact skin.

Distribution of cobalt within body tissues depends in large measure on the route of exposure (ATSDR, 2004). Cobalt as a component of cyanocobalamin (vitamin B12) is generally distributed among the body tissues. Highest levels following inhalation exposure are found in the tissues and lymph nodes of the respiratory tract. Lesser but elevated levels are found in liver, spleen and kidney. Highest levels are found in the liver following ingestion exposure.

Elimination also depends on route of exposure (ATSDR, 2004). Inhaled particulates are cleared by mucociliary elevation, phagocytosis and dissolution. Elevated particles are swallowed and subjected to GI absorption or throughput in the feces. Absorbed cobalt is excreted primarily through the urine.

4.0 Dermal Exposure

The provisional chronic oral RfD of 3E-4 for cobalt was derived from a study in which humans were treated orally with cobalt (EPA, 2008). A GAF of 1, as recommended by EPA (2004) is selected for cobalt.

Data were not located regarding the extent of dermal uptake of cobalt from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that

dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. The EPA (2004) K_p for cobalt of 4E-4 cm/hour is selected for cobalt.

5.0 Noncancer Effects Evaluation

Human health effects following oral exposure to cobalt include decreased iodine uptake by the thyroid, dermatitis in sensitized individuals, increased erythrocyte production and hemoglobin levels, and cardiomyopthy. Related effects to each of these, except dermatitis, are supported by animal studies. Other effects observed in animal studies include neurobehavioral and testicular; these effects were observed only at relatively high doses. Thyroid toxicity was selected as the critical effect for the derivation of provisional oral reference doses.
Cobalt is nutritionally essential as a cofactor in cyanocobalamin ATSDR, 2004). The element is ubiquitous and universally present in the diet. Data from a dietary survey performed in the 1980s indicate that daily U.S. dietary intakes of cobalt are in the range of 3E-3 to 1.1E-2 mg/day (4E-5 to 2E-4 mg/kg-day, assuming an average body weight of 70 kg). Chronic ingestion from the consumption of beer containing high concentrations of cobalt is associated with "beer-cobalt cardiomyopathy," which includes polycythemia and goiter, as well as marked myocardial degeneration and mortality. However, confounding variables were identified and a dose-response could not be derived from the associated studies (EPA, 2008).

A consistently produced effect of exogenously administered cobalt in humans is the erythropoietic effect of stimulating erythrocyte production resulting in increased blood hemoglobin concentration (EPA, 2002). Cobalt chloride has been used therapeutically at dose rates of 1.6E-1 to 3.2E-1 mg cobalt/kg-day in anemic, anephric dialysis patients for 12 to 32 weeks to induce a significant, but reversible, rise in blood hemoglobin concentration. Clinical studies demonstrating this effect identified an effect level of 1.8E-1 mg/kg-day, which EPA (2002) had previously designated a LOAEL. However, EPA (2008) has since identified confounding variables, and has judged the effects of cobalt in some of the patients in pertinent studies as beneficial rather than adverse.
A LOAEL of 1 mg/kg-day for subchronic thyroid toxicity as the critical oral effect was identified by EPA (2008) from a subchronic study by Roche and Layrisse (1956). A provisional subchronic RfD of 3E-3 mg/kg-day was derived assuming a composite UF of 300. This assumes a UF of 10 for LOAEL to NOAEL conversion, and a UF of 10 for inter-individual variability. An additional UF of 3 was added due to a lack of multigenerational studies, since testicular degeneration and sperm function were noted in some animal studies.

The provisional chronic oral RfD of 3E-4 mg/kg-day was derived as described for the subchronic RfD, with an additional UF of 10 added to extrapolate from subchronic to chronic exposure for a composite UF of 3,000 (EPA, 2008). Confidence in the principal study is described as low-to-medium.

The human and animal database indicate that symptoms of inhaled cobalt include respiratory tract irritation and altered pulmonary function. There were identified as the critical effects for exposure to inhaled cobalt for the derivation of RfDs. A NOAEL adjusted for continuous exposure of 1.9 $\mu g/m^3$ was identified by EPA (2008). A subchronic RfC of 2E-5 mg/m^3 was derived by EPA (2008) assuming a composite UF of 100, assuming a UF of 10 for database

insufficiencies and a UF of 10 for inter-individual variability. The preliminary subchronic inhalation RfC is equivalent to a preliminary subchronic inhalation RfD of 5.7E-5 mg/kg-day.

A provisional chronic RfC of 6E-6 mg/m3 was derived as described above for the subchronic RfC, but with an additional UF of 3 for the extrapolation from subchronic to chronic exposure (EPA, 2008). Thus, the composite UF is 300. This provisional RfC equals an inhalation RfD of 1.7E-6 mg/kg-day.

6.0 Carcinogenicity Evaluation

Human or animal studies examining the carcinogenicity of cobalt associated with oral exposure were not located. Therefore, cobalt is classified as having "inadequate information to assess carcinogenic potential" via the oral pathway, thus no cancer slope factor was derived (EPA, 2008).

Cobalt is described as "likely to be carcinogenic to humans by the inhalation route," based on limited evidence of carcinogenicity in humans (occupational studies) and sufficient evidence of carcinogenicity in animals (EPA, 2008). Respiratory tract tumors have been suggested in occupational studies as the result of inhaled cobalt. Statistically increased incidence of respiratory tract tumors have been observed in animal studies. Limited evidence supports genotoxicity and cytotoxicity, followed by cellular regeneration as potential modes of cobalt tumorigenicity. A mutagenic effect may be plausible for inhaled cobalt, but has not been clearly established (EPA, 2008).

Human inhalation studies were not sufficiently detailed to use in the derivation of a URF. Rats and mice exposed via inhalation to cobalt sulfate heptahydrate for 2 years developed alveolar and bronchial lung tumors (neoplasms and adenomas). EPA (2008) identified a benchmark dose level of In the absence of an identified mode of action, EPA developed a provisional URF by linear extrapolation of benchmark dose level of 0.011 mg/m^3. Using a benchmark response of 10 percent in extra risk, a provisional URF of 9E-3$(\mu g/m^3)^{-1}$ was derived for cobalt sulfate. This equals an inhalation SF of 3.2E+1 $(mg/kg\text{-}day)^{-1}$.

7.0 Toxicity Summary

Toxicity values for cobalt are summarized as follows:

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
3E-3	3E-4	Thyroid	2E-5/5.7E-5	6E-6/ 1.7E-6	RT	ND	ND	B	9E-3	3.2E+1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: RT = respiratory tract.

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IRON (7439-89-6)

1.0 Introduction and Physical Properties

Iron is a very abundant, ubiquitous, naturally occurring **metal** that constitutes approximately 5 percent of the earth's crust (Spivey Fox and Rader, 1988). It is the second most prevalent metal in the earth's crust following aluminum (HSDB, 2010). Its primary use is in making steels and other metals that have a wide range of application. Less than one percent of iron is used to make iron compounds that have application in dyes and pigments, water treatment, organic chemical synthesis, and medicinal preparations. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
55.85[a] (Element)	NA	NA	25[b]	NA	NA	ND	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Ferrous sulfate as a typical iron salt: soluble.
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[b] Baes, C.F., R.D. Sharp, H. Sjoreen, and R.W. Shor, ***A Review and Analysis for Assessing Transport of Environmentally Released Radionuclides through Agriculture, ORNL-5786, Oak Ridge National Laboratory*** .

2.0 Environmental Fate and Transport

There is little information available regarding the anthropogenic release of iron and its fate in the environmental, probably because of its prevalence in nature. Clearly, however, mining and handling of iron ores releases dust containing iron oxides (HSDB, 2010). Presumably the manufacture and use of iron compounds may result in release to the environment, but data were not located.

Insoluble iron compounds are most likely to occur in air as particulates, and are expected to deposit to soil and surface water (HSDB, 2010). Although data are unavailable, soluble compounds are expected to leach to groundwater, and to remain in solution in both groundwater and surface water. The extent of partitioning to sediment is expected to depend on water pH, organic matter and reduction-oxidation potential of the water system.

Biouptake of iron is known to occur, because the element is a nutritionally required trace element that is a structural component of heme proteins and some enzymes, which are common to mammals and several other orders of living organisms (Spivey Fox and Rader, 1988). However, there is no evidence that iron bioconcentrates in either aquatic or terrestrial food chain pathways. Therefore, biotransfer factors for iron are not presented.

3.0 Toxicokinetics

The GI absorption of iron is regulated by homeostatic mechanisms sited largely in the intestinal mucosa (Goyer, 1991; EPA, 2006). Approximately 2 to 15 percent of dietary iron is ordinarily absorbed; however, several dietary factors may increase or decrease absorption (HSDB, 2010). Dietary iron from animal sources is absorbed more readily (10 to 25 percent) than iron from

vegetables and grains (1 to 10 percent) (Elinder, 1986). Absorption is greatly increased at times of unusual need (rapid growth of childhood, pregnancy, blood loss). Divalent (ferrous) iron is absorbed into the intestinal mucosal cells and released to the blood plasma where it is oxidized to the trivalent (ferric) form, which binds with a specific protein, transferrin, for transport to storage sites.

Approximately 67 percent of iron in the body is associated with hemoglobin in the erythrocytes, 10 percent is associated with myoglobin and various iron-containing enzymes, and the remainder is bound to ferritin or hemosiderin, which are intracellular storage forms (Goyer, 1991). Ferritin and hemosiderin bind iron in a manner that renders it inactive for beneficial use (e.g., hemoglobin synthesis) and inactive as a toxicant. Some of the iron taken up by the cells of the reticuloendothelial system remains stored and some enters a labile pool that is available for erythropoiesis.

Excess iron is generally excreted, in part in shed intestinal epithelial cells, or in the bile or urine (Goyer, 1991). In cases of very high iron intake, excretion may be unable to remove iron as quickly as it is absorbed. Iron overload results, which stimulates increased synthesis of ferritin and increased iron storage, particularly in the liver, pancreas, spleen, various endocrine organs and the heart.

4.0 Dermal Exposure

As noted above, the GI absorption of iron appears to be under homeostatic control in normal humans (EPA, 2006), which suggests that GI absorption could vary widely between individuals depending on nutritional status. Given the uncertainty about the GI absorption of iron, a default GAF of 1 (EPA, 2004) is chosen for this evaluation.

Data were not located regarding the extent of dermal uptake of iron from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of iron from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for iron.

5.0 Noncancer Effects Evaluation

Iron is a nutritionally required trace element that forms an integral part of hemoglobin, myoglobin and several enzymes (Spivey Fox and Rader, 1988). The NAS (1989) Recommended Daily Allowance (RDA) for iron is 10 mg/day (0.13 mg/kg-day) for adult males; 15 mg/day (0.24 to 0.33 mg/kg-day) for females aged 11 to 50 years; 30 mg/day (0.443 mg/kg-day) for pregnant females; and 10 mg/day (0.36 to 1.11 mg/kg-day) for children aged 6 months to 10 years.

Both acute and chronic toxicity syndromes are associated with ingestion exposure to iron. Acute toxicity generally involves children (Goyer, 1991). Acute ingestion of large quantities (e.g., children may ingest several ferrous sulfate tablets with candy-like coating) results in severe GI irritation and, in some cases, liver damage. Liver cirrhosis and blood coagulation defects (indicative of reduced circulating levels of blood clotting factors produced by the liver) are observed as sequellae to severe acute toxicity.

Three chronic toxicity syndromes that result in iron overload have been observed in humans (Goyer et al., 1991). The first chronic syndrome is idiopathic hemochromotosis, which arises from a genetic derangement of the homeostatic mechanisms that control iron absorption. This syndrome involves greatly increased GI absorption of iron, regardless of the level of iron in the diet, which results in massive iron overload.

The second chronic syndrome is iron overload resulting from high dietary intake (Goyer, 1991). Although high dietary intake seldom results in iron overload in humans with normal homeostatic control of iron absorption, rare exceptions occur (EPA, 2006). One such exception is the occurrence of iron overload in Bantus who regularly consumed Kaffir beer, an acid beer brewed in iron vessels. This syndrome is not entirely understood; however, the iron in Kaffir beer appears to have exceptionally high bioavailability – equivalent to that of nutritional iron supplements especially formulated for bioavailability – which may account for the increased absorption and iron overload. Other exceptions include persons who take large amounts of tonics or nutritional supplements containing iron.

The third chronic syndrome involves persons requiring multiple blood transfusions over a period of time (Goyer, 1991). This results in the parenteral administration of large quantities of iron that are released as the transfused erythrocytes expire and are removed from the circulation by the reticuloendothelial system. As noted above, excretion cannot keep up with unusually high circulating levels of iron, such as results from multiple blood transfusions. Clearly, the third syndrome has no relevance to environmental exposure.

Regardless of the chronic syndrome that produces it, the effects of iron overload involve the same pathogenesis (Goyer, 1991). Iron stores in the body increase from the normal level of 3 to 5 g, to levels of 20 to 40 g. The cells are induced to increase production of ferritin, which binds the iron cation inactivating its toxicity. Increasingly larger proportions of iron are located in hemosiderin than in ferritin. Hemosiderin is a larger storage protein, probably formed primarily from ferritin. The iron in hemosiderin is essentially completely unavailable and nontoxic. Hemosiderosis is the term given to large accumulations of hemosiderin that do not result in adverse effects because the iron is unavailable. Extremely large accumulations of hemosiderin that result in impaired cellular function is termed hemochromotosis. Hemochromotosis of the liver, endocrine glands and heart is associated with reduced liver function, eventually liver cirrhosis, pancreatic fibrosis, diabetes mellitus, other endocrine disruption and cardiovascular effects.

Goyer (1991) and EPA (2006) reviewed the available data regarding the toxicity of iron. Neither source located any data clearly associating *environmental* exposure with toxicity. EPA (1996) reviewed a study associating high circulating ferritin levels and high dietary iron intakes with myocardial infarction in Finnish men, but association with other factors (e.g., high levels of red meat consumption) confounds interpretation of this study. Furthermore, attempts to produce an animal model of chronic iron toxicity have failed, presumably because of the efficacy of the homeostatic mechanisms that regulate iron absorption from the GI tract.

EPA (1996) reasoned previously that a NOEL for chronic iron overload could be inferred from the estimates of dietary intake and iron status (circulating ferritin levels) established by the second National Health and Nutrition Examination Survey (NHANES II) data base. The

NHANES II study determined that average dietary iron intakes, which ranged from 0.15 to 0.27 mg/kg-day, were associated with normal iron status. More recently, EPA (2006) has concluded that the assignment of a LOAEL based on iron overload for normal individuals cannot be determined based on existing data because of confounding factors in the studies.

EPA (2006) has determined that gastrointestinal toxicity, commonly associated with therapeutic use of iron supplements, is the critical effect. A provisional subchronic and chronic oral RfD of 0.7 mg/kg-day was derived, based on a LOAEL of 1 mg/kg-day and a UF of 1.5 (EPA, 2006). The same value was derived for both subchronic and chronic exposures because clinical experience with iron supplements indicates that the gastrointestinal irritation is associated with treatment and does not intensify with duration. Further, the effect is reversible once treatment is discontinued. A higher UF was not selected because of the reversibility and the effect is not regarded as serious (EPA, 2006).

Inhalation (occupational) exposure to iron oxide fumes may lead to radiographic densities in the lungs without demonstrable clinical effects (ACGIH, 1991). Inhalation of dusts or mists of ferric salts may irritate the respiratory tract. Inhalation data are insufficient for derivation of an inhalation RfC or RfD (EPA, 2005a).

6.0 Carcinogenicity Evaluation

Data regarding the potential carcinogenicity of iron were not located. Neither a cancer weight-of-evidence classification nor cancer potency factors are available (EPA, 2005b).

7.0 Toxicity Summary

Toxicity values for iron are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
7E-1	7E-1	GI	ND	ND	NA	ND	ND	ND	ND	ND

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: GI = gastrointestinal.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

In most cases, it is inappropriate to apply the toxicity values summarized above to environmental exposure.

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U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

INORGANIC MANGANESE (7439-96-5)

1.0 Introduction and Physical Properties

Manganese is a naturally occurring **metal** found in the earth's crust in the form of numerous minerals such as pyrolusite, romanechite, manganite and hausmannite (ATSDR, 2000; HSDB, 2010; Keen and Leach, 1988). It occurs ubiquitously in the environment, constituting approximately 0.085 percent of the earth's crust, commonly in valence states of +2, +4 and +7; valences of +1, +3, +5 and +6 are rare. Manganese is used in the manufacture of steel, and in other metallurgical processes, batteries, and various manganese-containing chemicals including matches, glass and porcelain, fireworks, varnishes, ceramics, diagnostic contrast media and fungicides. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
54.938[a] (Elemental)	NA	NA	65[b]	NA	NA	NA	Note 1[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Metallic manganese decomposes in the presence of water. Manganous chloride as a typical manganese salt: 7.23E+5 mg/L (25˚ C).
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[b]Baes, C.F., R.D. Sharp, A.L. Sjoreen, R.W. Shor, 1984, ***A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture***, Health and Safety Division, Oak Ridge National Laboratory, ORNL-5786, September.
[c]Agency for Toxic Substances and Disease Registry, (ATSDR), 2000, ***Update Toxicological Profile for Manganese***, U.S. Public Health Service, Atlanta, Georgia, September, on line.

2.0 Environmental Fate and Transport

Inorganic manganese compounds enter the atmosphere and other environmental compartments from the weathering of rocks and windblown soil (HSDB, 2010). Anthropogenic sources of atmospheric manganese include metal processing, disposal and use of manganese-containing materials (antiseptics, catalysts, dietary supplements, dry cells, feed additives, fertilizers, pesticides and pigments), resuspension of manganese-containing soil dust, and fly ash emissions from incinerators (ATSDR, 2000; HSDB, 2010). Another source of atmospheric manganese is the combustion of gasoline containing organic manganese anti-knock ingredients such as methylcyclopentadienyl manganese tricarbonyl (MMT). It is unclear whether manganese from this source remains as an organic form or is converted to an inorganic form. The use of MMT in gasoline has been discontinued because of deleterious effects on catalytic converters. Manganese may be released to water by discharge from industrial facilities or in leachate from landfills and soil. Landfill disposal of manganese-containing wastes is the predominant source of manganese release to soil.

Manganese exists in the air bound to particles; dry deposition is the primary removal mechanism, although wet deposition may also be significant (ATSDR, 2000). Manganese in fly ash exists as chlorides and oxides that are relatively soluble and mobile in the environment.

Manganese in water exists as any of several sparingly soluble salts that attach to suspended sediment (ATSDR, 2000). Sedimentation is the primary removal process. Soluble forms also exist, depending on pH of the water, and may be released from sediment. The extent of

absorption to constituents of soil is highly variable. Low concentrations may irreversibly bind to clay, but higher concentrations often manifest considerable mobility.

Manganese may accumulate in various kinds of plants such as legumes, nuts, heather, and tea, and in the lower aquatic trophic levels, but not significantly in the higher aquatic trophic levels or most terrestrial animals (ATSDR, 2000; HSDB, 2010). This indicates that food-chain pathways are unlikely to be significant for human health; therefore, biotransfer factors are not compiled or estimated.

3.0 Toxicokinetics

Manganese is nutritionally essential for humans (ATSDR, 2000). Stable tissue levels are maintained by homeostatic regulation of GI absorption and biliary excretion.

Manganese is absorbed by the respiratory tract (ATSDR, 2000), although data quantifying the extent of absorption were not located. Smaller particles are probably retained in the lung eventually to be absorbed; larger particles are probably removed by mucocilliary elevation and swallowed so that they become available for GI absorption. The more soluble compounds are more readily absorbed by the respiratory tract. Studies in rats given radiolabeled manganese by intranasal administration suggest that olfactory uptake and direct transmission to the brain may occur.

GI absorption of manganese in humans averages 3 to 5 percent, but homeostatic mechanisms reduce the extent of absorption at higher doses (ATSDR, 2000). The more soluble compounds are more readily absorbed. Iron deficiency enhances manganese uptake. Absorption appears to be more efficient and resulting tissue levels appear to be higher in infants than adults.

Quantitative data regarding dermal uptake of manganese were not located.

Normal tissue levels of manganese in humans range from 0.1 to 1 mg/kg wet weight with highest levels in liver, pancreas and kidney, and lowest levels in bone and fat (ATSDR, 2000). Animal studies (inhalation, intranasal, intratracheal and oral administration) confirm that many tissues including the brain, and in some instances specific regions of the brain, show significant increases in manganese levels after treatment. Tissue levels recede toward normal after treatment ceases.

Metabolism of manganese appears to be limited to oxidation-reduction changes in valence state (ATSDR, 2000). The evidence suggests that manganese (+2) is oxidized to manganese (+3), which alters its tissue distribution and slows excretion. Manganese is removed from the blood in the liver and is excreted principally through the bile. Urine, sweat and milk represent minor excretory routes. Animal studies show that the young are less efficient than adults in excreting manganese, although the young do not appear to be more sensitive to its effects.

4.0 Dermal Exposure

Data were not located regarding the extent of dermal uptake of manganese from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of

uncertainty. Empirical data regarding the uptake of soluble forms of manganese from water were not located. ATSDR (2000), however, notes that the uptake of manganese across intact skin is "extremely limited," suggesting that uptake of toxicologically significant amounts is unlikely. EPA (2004) provides no chemical-specific estimate of K_p for manganese; therefore, the default K_p value of 1E-3 cm/hr is used to estimate dermal uptake of manganese from water.

5.0 Noncancer Effects Evaluation

Manganese is nutritionally required by humans for normal growth and health (EPA, 2010). Humans exposed to approximately 0.8 mg manganese/kg-day in drinking water (28 mg/L) exhibited lethargy, increased muscle tonus, tremor and mental disturbances. The elderly appeared to be more sensitive than children. Oral treatment of laboratory rodents induces biochemical changes in the brain, but rodents do not exhibit the neurological signs exhibited by humans.

EPA (2010) verified a chronic oral RfD for manganese of 1.4E-1 mg/kg-day from a NOAEL of 1.4E-1 mg/kg-day for neurologic effects from human dietary studies and an uncertainty factor of 1. Confidence in the RfD is medium. The oral RfD of 1.4E-1 mg/kg-day will be used for dietary items other than drinking water. EPA (2010) recommends that the contribution of background diet should be subtracted and that a modifying factor of 3 should be used to adjust for use when oral exposure involves drinking water and non-dietary ingestion. The oral RfD resulting from these manipulations is 2.4E-2 mg/kg-day, which will be used for drinking water and incidental ingestion of non-dietary items. The CNS is the target organ for chronic oral exposure to manganese. EPA (1997) effectually adopts the chronic oral RfD as sufficiently protective for subchronic oral exposure.

The NOAEL described above is associated with a dose rate of approximately 10 mg/day for an adult. However, EPA (2002) notes that normal intake levels may well exceed 10 mg/day, especially with diets containing substantial amounts of whole-grain cereals, nuts, green leafy vegetables, and tea. Adverse effects have not been reported at dietary levels of 10 mg/day. It is likely that larger dose rates are innocuous as well.

Occupational exposure to high concentrations in air induces a generally typical spectrum of neurological effects, and increased incidence of pneumonia (ACGIH, 1991). EPA (2010) presents a verified chronic inhalation RfC of 5E-5 mg/m^3 (equivalent to an inhalation RfD of 1.4E-5 mg/kg-day) based on a LOAEL for neurological effects in occupationally exposed humans and an uncertainty factor of 1000. The uncertainty factor consists of three factors of 10 each to provide additional protection for unusually sensitive individuals, to extrapolate a NOAEL from a LOAEL, and to address database limitations including the less-than-chronic periods of exposure, the lack of developmental toxicity data, and uncertainty regarding potential but unquantified differences in the toxicity of different forms of manganese. Confidence in the RfC is medium. The CNS is the target organ for inhalation exposure to manganese. The chronic inhalation RfC is adopted as sufficiently protective for subchronic inhalation exposure.

6.0 Carcinogenicity Evaluation

EPA (2010) classified manganese in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). Quantitative cancer risk estimates are not derived for Group D chemicals.

7.0 Toxicity Summary

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1.4E-1[a]/ 2.4E-2[b]	1.4E-1[a]/ 2.4E-2[b]	CNS	5E-5/ 1.4E-4	5E-5/ 1.4E-5	CNS	D	ND	D	ND	ND

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ or critical effect abbreviations: CNS = central nervous system.
[a]Dietary items other than drinking water.
[b]Ingestion of environmental media and drinking water.

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THALLIUM (7440-28-0)

1.0 Introduction and Physical Properties

Thallium is a naturally occurring metal with an abundance of about 0.3-0.6 ppm in the earth's crust (HSDB, 2010). Thallium compounds are used in a variety of applications, including pharmaceuticals, semiconductors, photoelectric cells, optical systems, ore separation, glass production, and as oxidizing agents in organic synthesis (ATSDR, 1992; HSDB, 2010). An important former use of thallium and its compounds (before 1972) was in pesticide formulations for the control of insects and rodents. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
204.38[a] (Elemental)	NA	NA	7.1E+1[b,c]	NA	NA	NA	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Thallium sulfate as a typical thallium salt: 4.87E+4 mg/L (20˚ C).
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 1992, ***Toxicological Profile for Thallium***, U.S. Public Health Service, Atlanta, Georgia, July, on line.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.
[c]pH = 6.8.

2.0 Environmental Fate and Transport

Thallium is released to the atmosphere largely from coal-burning power plants, cement factories, and ferrous and nonferrous smelting operations (ATSDR, 1992; HSDB, 2010). Facilities that produce or use thallium or its compounds account for a much smaller part of the total release.

Thallium in air exists as oxide, hydroxide, sulfate or sulfide particles (ATSDR, 1992; HSDB, 2010). The hydroxide and sulfate are water soluble and may partition to water vapor for eventual removal in precipitation. The less soluble particulate forms are probably removed by dry deposition.

Thallium released to surface water usually occurs as the monovalent ion that forms soluble salts with several anions (ATSDR, 1992; HSDB, 2010). Adsorption to suspended particulates may also occur, but the soluble forms remain in the water column.

Although empirical data are sparse, the high solubility of several thallium salts suggests that mobility in soil could be high and the potential for leaching could be significant (ATSDR, 1992).

Terrestrial plants have been shown to absorb thallium from soil, but there is no evidence that biomagnification occurs. EPA (1995) identifies thallium as a chemical unlikely to be of concern for bioaccumulation in aquatic food chains. For these reasons it is concluded that thallium is unlikely to participate significantly in food-chain pathways and biotransfer factors are not estimated or compiled.

3.0 Toxicokinetics

Data regarding absorption from the respiratory tract following inhalation exposure were not located; however, small particles are probably absorbed to some extent and larger particles are probably removed by mucocilliary clearance and swallowed, where they become available for GI absorption. Thallium compounds appear to be completely absorbed from the GI tract in humans and laboratory animals (ATSDR, 1992). Quantitative data regarding dermal uptake of thallium were not located, although HSDB (2010) states that absorption through the skin occurs readily.

Tissue levels in acutely poisoned humans appear to be highest in the brain in regions dense with neurons, such as the gray matter (HSDB, 2010). Tissue distribution testing in a single human volunteer cancer patient treated orally with a small dose of radiolabeled thallium indicated that highest concentrations were located in scalp hair followed by kidney, heart, bone, spleen and brain (ATSDR, 1992). Distribution in orally treat laboratory animals is rapid and widespread, with higher levels generally associated with the kidney. The rank of levels in other tissues is more variable (ATSDR, 1992), but high levels are ordinarily found in the testis (HSDB, 200).

The biological half-life in rats in one study was 3.3 days, indicating that excretion is efficient (ATSDR, 1992). Excretion in humans may be somewhat slower. Excretion appears to be primarily through the urine in humans, and through the urine and feces. However, the data are somewhat confusing because animal studies indicate that the ratio of fecal to urinary excretion increases with time. This suggests that biliary excretion and enterohepatic recirculation may be operative, which could result in underestimation of fecal excretion in the human study.

4.0 Dermal Exposure

As noted above, GI absorption of thallium is essentially complete. EPA (2004) concluded that a GAF should not be estimated for thallium for the purpose of adjusting oral toxicity values for dermal exposure. Therefore, the oral toxicity values described below are used directly without adjustment for evaluating dermal exposure.

Thallium may be readily absorbed by the skin (HSDB, 2010); however, data were not located regarding the extent of dermal uptake of thallium from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of thallium from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for thallium.

5.0 Noncancer Effects Evaluation

Thallium is highly toxic. Acute oral exposure to thallium and its compounds may cause death preceded by neurological disturbances and effects on the lungs, heart and liver (ATSDR, 1992). Formerly, thallium was used medicinally to induce alopecia to facilitate treatment of ringworm of the scalp, sometimes with disastrous results. The critical effect of chronic oral exposure to low levels of thallium compounds in animals and humans is alopecia (ACGIH, 1992; EPA, 2010). EPA (2010) had previously verified chronic oral RfDs for several thallium salts (thallium acetate, thallium carbonate, thallium chloride, thallium nitrate and thallium sulfate) based on a study with thallium sulfate; these RfDs were removed from IRIS in September 2009. Currently, no RfD exists for thallium, thallium salts, or thallium compounds (EPA, 2010). The previous oral

RfD that had been listed on IRIS for thallium sulfate of 8E-5 mg/kg-day was based on a NOAEL of 0.25 mg/kg-day in rats treated by gavage with thallium sulfate for 90 days. No adverse effects were seen in this study. An uncertainty factor of 3000 was used, consisting of factors of 10 each to extrapolate from subchronic to chronic data, for intraspecies extrapolation and to account for interspecies variability, and a factor of 3 to account for lack of reproductive and chronic toxicity data. Confidence in the chronic RfD is low. The skin (alopecia) and liver (altered blood biochemistry) are considered the target organs for oral exposure to thallium, based on other data reviewed by EPA (2010). Effects on the testis and kidney were observed in rats exposed to higher dose rates. The chronic oral RfD for thallium sulfate of 8E-5, when adjusted for differences in molecular weight, is equivalent to a chronic oral RfD for thallium of 6.5E-5 mg/kg-day. This adjustment is based on the assumption that the toxicity of thallium sulfate is due entirely to thallium, rather than to the sulfate moiety. The oral RfD for thallium of 6.5E-5 mg/kg-day will be used in this evaluation.

EPA (1997) provides a provisional subchronic oral RfD for thallium sulfate of 8E-4 mg/kg-day, equivalent to a subchronic oral RfD for thallium of 6.5E-4 mg/kg-day, based on the study discussed above and an uncertainty factor of 300, eliminating the factor of 10 to expand from subchronic to chronic exposure. EPA (1997) provides provisional subchronic chronic oral RfDs for several thallium salts (thallium acetate, thallium carbonate, thallium chloride, thallium nitrate and thallium sulfate) based on the same study with thallium sulfate.

Inhalation exposure data are very limited. An occupational study suggests that neurological effects may develop following prolonged inhalation exposure (ATSDR, 1992). The nervous system appears to be more sensitive than the skin as a target organ for inhalation exposure. The data are inadequate for estimation of an inhalation RfC or RfD.

6.0 Carcinogenicity Evaluation

Several thallium compounds (thallium oxide, thallium acetate, thallium carbonate, thallium chloride, thallium nitrate, thallium sulfate) are classified as cancer weight-of-evidence Group D substances (not classifiable as to carcinogenicity to humans) (EPA, 2010). No weight-of-evidence classification was located for thallium alone, but the Group D classification can be applied to thallium. Quantitative cancer risk estimates are not derived for Group D chemicals.

7.0 Toxicity Summary

Toxicity values for thallium are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
6.5E-4	6.5E-5	S, L	ND	ND	NA	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: L = liver; S = skin.

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.										

8.0 References

Agency for Toxic Substances and Disease Registry, (ATSDR), 1992, ***Toxicological Profile for Thallium***, U.S. Public Health Service, Atlanta, Georgia, July, on line.

Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.

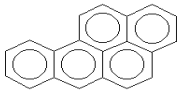
U.S. Environmental Protection Agency (EPA), 1995, □40 CFR 9, 122, 123, 131, and 132 Final Water Quality Guidance for the Great Lakes System; Final Rule,□ ***Federal Register***, 60(56); 15366-15425.

U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP July.

U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

Semivolatile Organic Compounds

POLYNUCLEAR AROMATIC HYDROCARBONS a.k.a. POLYCYCLIC AROMATIC HYDROCARBONS a.k.a. POLYAROMATIC HYDROCARBONS (PAH) (130498-29-2)



Benzo(a)Pyrene
(A representative and the most studied member of this class of compounds.)

1.0 Introduction and Physical Properties

The PAHs regularly observed in environmental media and addressed in this profile include acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene. All exist as solids at room temperature. Classification as **SVOC** or **VOC** is made in the following table. PAHs are the products of incomplete combustion of fossil fuels or other organic matter, hence include both natural and anthropogenic sources (ATSDR, 1995a; HSDB, 2010). Several are also components of crude oil. Naphthalene is used in the synthesis of phthalic anhydride, the insecticide carbaryl, leather tanning agents and surface active agents, and is a component of diesel and other fuels (ATSDR, 1995b). Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
Acenaphthene (83-32-9) **(VOC)**										
154.21[a]	3.92[a]	1.55E-4[b] (25°C)	3.85[b]	4.21E-2[b] (25°C)	7.69E-6[b] (25°C)	3.29E-6[a] (25°C)	4.24E+0[b] (20-25°C)	550.54[c]	803.15[c]	1.22E+4[c]
Acenaphthylene (208-96-8) **(VOC)**										
152.20[a]	4.07[a]	1.13E-5[a] (25°C)	3.42[a]	6.67E-2[d] (25°C)[e]	7.72E-6[d] (25°C)[e]	1.20E-6[a] (25°C)	3.93E+0[a] (25°C)	543.2[a]	797[f]	1.1E+4[g]
Anthracene (120-12-7) **VOC)**										
178.23[a]	4.45[a]	6.51E-5[b] (25°C)	4.47[b]	3.24E-2[b] (25°C)	7.74E-6[b] (25°C)	3.51E-9[a] (25°C)	4.34E-2[b] (20-25°C)	615.18[c]	873.00[c]	1.31E+4[c]
Benzo(a)anthracene (56-55-3) **(SVOC)**										
228.3[h]	5.66[h]	3.34E-6[b] (25°C)	5.60[b]	5.10E-2[b] (25°C)	9.00E-6[b] (25°C)	2.50E-9[a] (25°C)	9.40E-3[b] (20-25°C)	708.15[c]	1004.8[c]	1.60E+4[c]
Benzo(a)pyrene (50-32-8) **(SVOC)**										
252.3[a]	6.10[h]	4.57E-7[k] (25°C)	6.01[b]	4.30E-2[b] (25°C)	9.00E-6[b] (25°C)	7.22E-12[a] (25°C)	1.62E-3[b] (20-25°C)	715.90[c]	969.27[c]	1.90+4[c]
Benzo(b)fluoranthene (205-99-2) **(VOC)**										
252.3[h]	6.12[h]	6.57E-7[k] (25°C)	6.09[b]	2.26E-2[b] (25°C)	5.56E-6[b] (25°C)	6.58E-10[a] (20°C)	1.50E-3[b] (20-25°C)	715.90[c]	969.27[c]	1.70+4[c]
Benzo(k)fluoranthene (207-08-9) **(SVOC)**										
252.32[a]	6.84[a]	8.29E-7[b] (25°C)	6.09[b]	2.26E-2[b] (25°C)	5.56E-6[b] (25°C)	1.28E-12[a] (25°C)	8.00E-4[b] (20-25°C)	753.15[c]	1019.7[c]	1.80E+4[c]
Benzo(g,h,i)perylene (191-24-2) **(SVOC)**										
276.34[a]	6.63[a]	2.66E-7[a] (20°C)	4.98[a]	4.48E-2[d] (25°C)[e]	5.19E-6[d] (25°C)[e]	1.3E-13[a] (25°C)	2.6E-4[a] (25°C)	823[a]	1097[f]	1.96E+4[g]
Chrysene (218-01-9) **(VOC)**										
228.3[h]	5.66[h]	9.46E-5[b] (25°C)	5.60[b]	2.48E-2[b] (25°C)	6.21E-6[b] (25°C)	8.20E-12[a] (25°C)	1.60E-3[b] (20-25°C)	714.15[c]	979.0[c]	1.65E+4[c]
Dibenz(a,h)anthracene (53-70-3) **(SVOC)**										
278.4[h]	6.84[h]	1.47E-8[b] (25°C)	6.58[b]	2.02E-2[b] (25°C)	5.18E-6[b] (25°C)	1.32E-13[a] (20°C)	2.49E-3[b] (20-25°C)	743.24[c]	990.41[c]	3.00E+4[c]
Fluoranthene (206-44-0) **(VOC)**										
202.3[h]	4.95[h]	1.61E-5[b] (25°C)	5.03[b]	3.02E-2[b] (25°C)	6.35E-6[b] (25°C)	1.21E-8[a] (25°C)	2.06E-1[b] (20-25°C)	655.95[c]	905.0[c]	1.38E+4[c]

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
Fluorene (86-73-7) **(VOC)**										
166.21[a]	4.18[i]	6.37E-5[b] (25°C)	4.14[b]	3.63E-2[b] (25°C)	7.88E-6[b] (25°C)	4.21E-7[a] (20°C)	1.98E+0[b] (20-25°C)	570.44[c]	870.0[c]	1.27E+4[c]
Indeno(1,2,3-cd)pyrene (193-39-5) **(SVOC)**										
276.3[h]	6.58[h]	1.60E-6[b] (25°C)	6.54[b]	1.90E-2[b] (25°C)	5.66E-6[b] (25°C)	1.71E-13[a] (25°C)	2.20E-5[b] (20-25°C)	809.15[c]	1078.2[c]	1.90E+4[c]
Naphthalene (91-20-3) **(VOC)**										
128.2[h]	3.30[h]	4.40E-4[k] (25°C)	3.30[b]	5.90E-2[b] (25°C)	7.50E-6[b] (25°C)	1.12E-4[a] (25°C)	3.10E+1[b] (20-25°C)	491.14[c]	748.40[c]	1.04E+4[c]
Phenanthrene (85-01-8) **(VOC)**										
178.2[h]	4.46[h]	1.24E-4[a] (25°C)	4.36[a]	6.00E-2[d] (25°C)[e]	6.95E-6[d] (25°C)[e]	8.95E-7[a] (25°C)	1.29E+0[a] (25°C)	613.2[a]	869.2[j]	1.42E+4[a]
Pyrene (129-00-0) **(VOC)**										
202.26[a]	4.88[a]	1.1E-5[b] (25°C)	5.02[b]	2.72E-2[b] (25°C)	7.24E-6[b] (25°C)	1.17E-7[a] (25°C)	1.35E-1[b] (20-25°C)	667.95[c]	936.0[c]	1.44E+4[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);.$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole); ND = no data.

[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line, accessed 23 April.

[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

[c]U.S. Environmental Protection Agency (EPA), 2000, ***User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings, Revised***, Office of Emergency and Remedial Response, Washington, DC, December.

[d]Calculated as described in Introduction to Toxicological profiles.

[e]Assumed.

[f]Estimated from Equation 12-4 in Lyman, W.J., W.F. Reehl and D.H. Rosenblatt, 1990, ***Handbook of Chemical Property Estimation Methods***, American Chemical Society, Washington, DC.

[g]Estimated from Equation 13-5 in Lyman, W.J., W.F. Reehl and D.H. Rosenblatt, 1990, ***Handbook of Chemical Property Estimation Methods***, American Chemical Society, Washington, DC.

[h]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

[i]Syracuse Research Corporation (SRC), 2004, ***CHEMFATE Search Results***, on line, accessed 23 April.

[j]National Institute of Standards and Technology (NIST), 2004, Standard Reference Data Program, Online Data Bases, accessed 23 April.

[k]U.S. Environmental Protection Agency (EPA), 2010, *EPISuite electronic database*.

2.0 Environmental Fate and Transport

The PAHs are ubiquitous products of incomplete combustion; natural sources include volcanoes and forest fires (ATSDR, 1995a, b; HSDB, 2010). There is some evidence for biosynthesis by plants, bacteria and algae. Some of the PAHs occur naturally in fossil fuels. Anthropogenic releases to the environment, primarily to the atmosphere, greatly outweigh the natural sources and include any processes that involve incomplete combustion of fossil fuels and organic matter, including wood-burning for home heat (the predominant source), cigarette smoke, internal combustion engine exhaust, and fuel oil emissions. Industrial sources include coal mining, processing and storing, wood treatment (creosote), manufactured gas plants (coal tar), power generation, production of coal tar, coke and asphalt, petroleum cracking and industrial and municipal incineration. Other sources include various crude oils, fresh and used motor oils, gasolines, charcoal-broiled foods, processed foods, various oils, margarine, butter and fats, fruits, vegetables, and cereals, roasted coffee and tea. Indoor sources include unvented kerosene heaters and gas cooking and heating appliances. Naphthalene is released during its manufacture and processes that involve its use (e.g., vaporization from moth balls).

Although PAHs generally occur in mixtures, certain chemicals tend to predominate in different sources so that the PAH pattern observed in a given medium may provide a clue to the source. The following compilation relates individual PAHs and sources:

Source[a]	Individual PAHs
Residential wood burning	Acenaphthylene
Auto emissions	Benzo(g,h,i)perylene, pyrene
Diesel exhaust particulates	Fluoranthene, phenanthrene, pyrene
Diesel exhaust vapors	Phenanthrene, anthracene

Source[a]	Individual PAHs
Diesel total emissions	Acenaphthene, fluorene, phenanthrene
Fly ash & bottom ash from U.S. municipal waste incinerators	Phenanthrene
Fly ash from U.K. municipal waste incinerators	Benzo(g,h,i)perylene
Particulate emissions from municipal waste incinerator	Benzo(a)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene
Municipal/medical waste incinerator	Benzo(a)anthracene, benzo(g,h,i)perylene
Rotary kiln incinerator charged with polyethylene, no afterburner	Fluoranthene, phenanthrene, pyrene (see next entry)
Rotary kiln incinerator charged with polyethylene with afterburner	Benzo(a)anthracene, phenanthrene (total PAH emissions reduced 100-fold compared with no afterburner)
Coal tar pitch emissions	Phenanthrene and pyrene 20 to 80 X > benzo(a)pyrene, benzo(g,h,i)perylene
Natural gas home appliances – fine particulate emissions	Chrysene, fluoranthene, pyrene, triphenylene
Groundwater near coal & oil gasification plant	Acenaphthylene, acenaphthene, fluorene, phenanthrene, fluoranthene, pyrene, chrysene
Groundwater near wood treatment facilities	Benzo(a)pyrene, phenanthrene
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 1995, ***Update Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs)***, U.S. Public Health Service, Atlanta, Georgia, August, on line.	

Data compiled for soils are not included in the table above because the lists are long and the variation from one site to another is great, so that the information is not useful for identifying sources. Similarly, sediment is a sink for PAHs from all sources including atmospheric deposition from far distant locations, and the patterns observed in sediment do not necessarily reflect a nearby source (ATSDR, 1995a). Generally, PAHs associated with combustion exhibit highly condensed ring structures and little alkylation (i.e., benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, benzo(e)pyrene, chrysene, fluoranthene, pyrene).

Crude petroleum and products made from crude petroleum (e.g., asphalts, fuels, oils) contain PAHs, but the patterns observed depend on the location of the source (ATSDR, 1995a; Potter and Simmons, 1998). Phenanthrene and alkylated forms of PAHs, particularly the methylnaphthalenes, often predominate in petroleum products.

The partitioning and fate of the PAHs in environmental media depend largely on VP (tendency to exist in air as a vapor), H (indicator of partitioning between air and water) and K_{oc} (indicator of affinity to bind to organic matter in soil and sediment). ATSDR (1995a) noted that H and K_{oc} are roughly directly related to MW, and that VP is roughly inversely related to MW. Therefore, they grouped the PAHs into the following categories to facilitate understanding their behavior in the environment:

- Low MW (152 to 178 g/mole) – acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene

- Medium MW (approximately 202 g/mole) – fluoranthene, pyrene

- High MW (228 to 278 g/mole) – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.

PAHs exist in the atmosphere as vapors or adsorbed to particulates, the proportion depending on the vapor pressure of the individual chemical and atmospheric conditions such as temperature and humidity (ATSDR, 1995a, b; HSDB, 2010). Generally, the two- and three-ring compounds (low and medium MW except pyrene) exist predominantly as vapors; the four-ring compounds exist in both the vapor and particulate phase, and compounds with 5 or more rings (benzo[a]pyrene, benzo[g,h,i]perylene exist predominantly as particulates. Increasing atmospheric temperature and relative humidity favors existence in the vapor phase. PAHs may travel short or long distances before removal from the air. Vapor forms are subject to chemical oxidation processes in the air, which reduces the distance they may travel. Residence time and transport distance is inversely related to the size of the particles on which the PAHs are adsorbed. Small particles may have residence times of weeks, permitting transport for hundreds or upwards of a thousand miles. Wet and dry deposition accounts for removal of the particulates.

The predominant sources of PAHs in surface water are deposition from the atmosphere, industrial and sewage effluent and oil spills (ATSDR, 1995a, b). Runoff and erosion can also contribute PAHs to surface water bodies. Volatilization is a significant fate process for PAHs with H values of 1E-5 atm-m^3/mole or greater (generally the low and medium MW compounds). Volatilization is a very limited removal process for most of the high MW compounds. Volatilization is enhanced by high temperature, turbulence and high wind. Sorption to benthic or suspended sediment and biodegradation are competing removal processes. Generally, volatilization and biodegradation are the predominant removal processes for the low MW compounds, and volatilization and sorption are the predominant removal processes for medium and high MW compounds. Naphthalene is relatively water soluble and may remain largely in solution. PAHs in sediment may biodegrade, recycle back to the water column (lower MW compounds) or accumulate in the lower trophic levels of living organisms.

Deposition from the atmosphere is the principal source of PAHs in soil (ATSDR, 1995a, b). Other sources include industrial activities, disposal of sewage sludge, and leaching from coal storage sites. Most PAHs sorb to soil constituents because of their low solubility and high affinity for organic matter. Volatilization is an important removal process for the low molecular weight compounds. Some of the low molecular weight compounds, particularly naphthalene, may leach fairly rapidly to groundwater.

The high lipophilicity of many PAHs evidenced by high log K_{ow} values suggest that the PAHs might cross biologic membranes and participate significantly in food-chain pathways involving fish, fruit and vegetable, and meat and milk consumption. This, however, is not the case. For example, the PAHs are efficiently metabolized and excreted by fin fish, greatly reducing the likelihood of bioconcentration from water or bioaccumulation from sediment (ATSDR, 1995a). Consequently, there are often great discrepancies between modeled BCF values and empirical BCF values, where care was taken to identify the parent compound rather than PAH metabolites in fish tissue. This distinction is necessary because aromatic fragments from PAH metabolism are readily assimilated as normal endogenous components of biological tissue. PAH concentrations in aquatic food-chain systems usually decrease with increasing trophic level, reflecting the generally greater efficiency of metabolism in the higher trophic organisms.

Approximate tissue-to-sediment PAH concentration ratios were reported to be 0.6 to 1.2 for amphipods, 0.1 for clams, and 0.05 for fin fish and shrimp.

It has been reported that terrestrial plants can accumulate PAHs from soil by uptake through the roots (ATSDR, 1995a). More careful investigation, however, reveals that root uptake is quite low, and there is no evidence of bioconcentration or biomagnification. For example, PAH ratios in vegetation to soil in one survey ranged from 0.001 to 0.18 for total PAHs, and from 0.002 to 0.33 for benzo(a)pyrene. It is likely that most of the PAH contamination on the vegetation resulted from atmospheric deposition. Increased concentrations in vegetation have not been observed when soil PAH concentrations were greatly increased by amendment with sewage sludge. Data from carrots (*Daucus carotu*) showed that PAHs adhere to the outer skin of the root but show little tendency to penetrate to deeper layers, and even less tendency to translocate to aerial parts.

The inability of plants to bioconcentrate PAHs from soil reduces concern for bioconcentration in agricultural products such as meat and milk. It should be noted, however, that measurable concentrations of PAHs may accumulate on the aerial parts of plants because of deposition from the atmosphere (ATSDR, 1995a). Also, food-producing animals ingest a substantial amount of soil while grazing or consuming mechanically harvested forage crops. Mammals, however, efficiently metabolize the PAHs to polar compounds that are readily excreted, reducing concern for bioconcentration.

In summary, the PAHs are highly lipophilic, which implies significance in food-chain exposure pathways. Empirical data, however, show that fish and mammals efficiently metabolize and eliminate these compounds. Furthermore, bioconcentration in plants because of uptake from soil is not significant. Therefore, it is unlikely that the PAHs would participate significantly in food-chain pathways, and biotransfer factors are not estimated.

3.0 Toxicokinetics

The PAHs are absorbed by all routes of exposure, but the rate and extent depends on the compound, the species of animal and the vehicle (or nature of the particulates) (ATSDR, 1995a). PAHs are readily absorbed during inhalation exposure; however, intratracheal instillation studies indicate that particle size is the most important determiner of the extent of pulmonary uptake.

Toxicokinetic studies of several PAHs summarized by ATSDR (1995a) provide limited quantitative information regarding the extent of GI absorption. Limitations arise largely because biliary excretion complicates quantification of uptake from the GI tract. A study of benzo(a)pyrene in rats suggests that GI absorption ranges from 38 to 58 percent. A study in rats reported absorption efficiency for anthracene ranging from 53 to 74 percent. GI absorption of pyrene, chrysene and dibenzo(a,h)anthracene is described as high. Administration of the test compound in oil or in a high-fat diet appears to increase the extent of GI absorption.

Empirical data with pure compound dissolved or suspended in various vehicles suggest that dermal uptake of benzo(a)pyrene is extensive (ATSDR, 1995a). One occupational study reported that approximately 75 percent of systemically absorbed pyrene entered the body through dermal uptake rather than through inhalation exposure. Combining PAHs with soil appears to significantly reduce the extent of dermal uptake compared with oleaginous or acetone vehicles.

Anecdotal evidence from using cloth diapers stored in contact with naphthalene indicates that naphthalene is absorbed by the skin, but quantitative data are not available (ATSDR, 1995b).

Distribution of absorbed PAHs is generally widespread, with highest levels located initially in lipid-rich tissues (ATSDR, 1995a). Highest levels of metabolites (radioactivity following administration of radiolabeled compounds) are located in the liver and GI tract, even after inhalation exposure, probably reflecting extensive metabolism in the liver followed by biliary excretion. Ciliary clearance and deglutition probably contribute to levels associated with the GI tract. Concentrations of radioactivity following administration of radiolabeled compound reveal fetal levels approximately 2- to 10-fold lower than maternal levels, although this depends on the specific compound administered.

Metabolism of the PAHs, particularly benzo(a)pyrene, has been extensively studied (ATSDR, 1995a). Metabolism proceeds rapidly, yielding products that are more water soluble and readily excreted than the parent compound. All tissues have the ability to metabolize the PAHs, potentially to carcinogenic intermediates, which probably accounts for the observation that cancers occur at the point of contact. There is considerable variability in tissue metabolic activity; however, the liver is probably the most active in most cases.

ATSDR (1995a) distinguishes between “alternant” and “nonalternant” PAHs, based on the nature of the electron density associated with the molecule, which influences how that compound is metabolized to its ultimate carcinogen. Alternant PAHs (e.g., benzo[a]pyrene, benzo[a]anthracene, chrysene, dibenz[a,h]anthracene) exhibit a uniformly distributed electron density. Nonalternant PAHs (e.g., fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-cd]pyrene) behave more like two separate molecules because of uneven electron distribution.

Alternant PAHs (based on data for benzo[a]pyrene) are initially metabolized by the microsomal cytochrome P-450 system to several arene oxides (ATSDR, 1995a). These may re-arrange spontaneously to phenols or undergo hydration to form the corresponding trans-dihydrodiols. Further oxidation of the dihydrodiols results in formation of quinones, phenol diols and dihydrodiol epoxides. Phenols may be formed by direct insertion of oxygen into a ring. Many of the metabolites resulting from the reactions described above are subject to conjugation with various substrates followed rapidly by excretion. The dihydrodiol epoxides that form in the “bay” region (the three-sided concave region formed by the fusion of three benzene rings) are most likely the ultimate carcinogens that covalently bind to macromolecules such as DNA, resulting in alkylation or other adducts that yield genetic errors.

Metabolism of the nonalternant PAHs differs from the alternant PAHs in that more extensive oxidation to hydroxy-epoxy-diols may be important to achieve genotoxicity (ATSDR, 1995a). Dihydrodiol epoxide formation in the bay region is associated with carcinogenicity of the PAHs generally; however, some of the nonalternant PAHs yield reactive metabolites that deviate from the classical bay region model.

PAH metabolites are readily excreted, largely through the bile, although some metabolites are excreted by the kidney (ATSDR, 1995a). The extent of elimination is species specific. In one inhalation study rats excreted metabolites much more efficiently than dogs or monkeys.

4.0 Dermal Exposure

EPA (2004) recommends that oral toxicity values for the PAHs should not be adjusted when applied to dermal exposure because GI absorption probably exceeds 50 percent. Therefore, no GAF is estimated and the oral toxicity values described below should be used for dermal exposure without adjustment.

Empirical data with pure compound dissolved or suspended in various vehicles suggest that dermal uptake of benzo(a)pyrene is extensive (ATSDR, 1995a). Anecdotal evidence from using cloth diapers stored in contact with naphthalene indicates that naphthalene is absorbed by the skin, but quantitative data are not available (ATSDR, 1995b). EPA (2004) reviewed empirical data regarding dermal uptake of benzo(a)pyrene and recommended an ABS of 0.13 for the PAHs. However, EPA (2004) also notes that VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels. Therefore, the ABS of 0.13 is applied to all the PAHs identified above as SVOCs. Dermal uptake of the PAHs identified as VOCs is not quantified.

Values for t*, K_p, τ, FA and B are provided or estimated as follows:

Chemical	t*	K_p	τ	FA	B
Acenaphthene[a]	1.84	8.39E-2	7.67E-1	1	0.4
Acenaphthylene[a]	1.79	1.08E-1	7.47E-1	1	0.5
Anthracene[a]	4.06	1.38E-1	1.05E+0	1	0.7
Benzo(a)anthracene[b]	8.53	4.7E-1	2.03E+0	1.0	2.8
Benzo(a)pyrene[b]	11.67	7.0E-1	2.69E+0	1.0	4.3
Benzo(b)fluoranthene[b]	12.03	7.0E-1	2.77E+0	1.0	4.3
Benzo(k)fluoranthene[a]	12.40	2.00E+0	2.72E+0	0.4	12
Benzo(g,h,i)perylene[a]	8.89	1.07E+0	3.70E+0	0.7	6.8
Chrysene[b]	8.53	4.7E-1	2.03E+0	1.0	2.8
Dibenz(a,h)anthracene[b]	17.57	1.5E+0	3.88E+0	0.6	9.7
Fluoranthene[b]	5.68	2.2E-1	1.45E+0	1.0	1.2
Fluorene[a]	2.15	1.07E-1	8.95E-1	1	0.5
Indeno(1,2,3-cd)pyrene[b]	16.83	1.0E+0	3.78E+0	0.6	6.7
Naphthalene[b]	1.34	4.7E-2	5.6E-1	1	0.2
Phenanthrene[b]	4.11	1.4E-1	1.06E+0	1	0.7
Pyrene[a]	3.42	1.94E-1	1.43E+0	1	1.1

t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).
[a]Estimated as described in Introduction to Toxicological profiles.
[b]Provided by U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

5.0 Noncancer Effects Evaluation

The PAHs are generally divided into two EPA cancer weight-of-evidence groups: Group D – not classifiable as to carcinogenicity to humans, and Group B2 – probable human carcinogens. The Group D PAHs have not been evaluated for carcinogenicity by toxicity testing; therefore, cancer SFs or URFs cannot be estimated for these compounds (EPA, 1986, 2010). Risk evaluation of these compounds is limited to noncancer effects. It is theoretically possible that cancer risk could be the "driver" for some of these compounds. However, the mechanism of carcinogenicity of the PAHs is fairly well understood to be correlated with molecular morphology and the propensity to

form certain active metabolites (ATSDR, 1995a). The Group D PAHs either do not fit the morphologic mold or have been shown empirically to be unlikely to cause cancer, reducing greatly the uncertainty that significant cancer risk is being overlooked.

Cancer SFs and URFs are available for the Group B2 compounds, but noncancer RfDs or RfCs are not. Therefore, risk evaluation of these compounds is limited to cancer risk. These compounds have the morphologic requirements for carcinogenicity; therefore, it has been thought that cancer risk is the driver, and that noncancer effects are relatively insignificant, although empirical data were lacking until recently.

Recent data support this assumption. De Jong et al. (2008) reported a study in which male rats were treated by gavage with benzo(a)pyrene 5 days per week for 35 days at dose rates of 0 (control), 3, 10, 30 or 90 mg/kg. Significantly reduced rate of body weight gain and altered organ weights were observed in the 90 mg/kg group. Fore stomach lesions were found in the 30 and 90 mg/kg groups. Decreased thymus weights and hematological evidence of erythrocyte toxicity were observed in a dose-related manner in rats treated with 10 mg/kg and above. Subtle alterations in measures of immune function were also observed in these groups, establishing 10 mg/kg as the LOAEL and 3 mg/kg as the NOAEL for this study. The 3 mg/kg dose is equivalent to a NOAEL of 2.1 mg/kg-day when adjusted for continuous exposure. Application of an uncertainty factor of 1000 (factor of 10 to expand from subchronic to chronic exposure, and factors of 10 each to provide additional protection for intra- and interspecies variation) allows development of a preliminary oral RfD of 2E-3 mg/kg-day. Uncertainty surrounding the preliminary oral RfD is very high because the data base for the noncancer effects of benzo(a)pyrene is essentially limited to one study and several toxicological endpoints (e.g., developmental, reproductive, neurological) were not investigated.

The sole purpose for developing this oral RfD is to evaluate the potential for noncancer effects to be the driver for the Group B2 PAHs. The RfD was not developed with sufficient rigor to be used in the risk assessment of the noncancer effects of benzo(a)pyrene. The oral SF for benzo(a)pyrene is 7.3 per mg/kg-day (please see below), from which it is estimated that the oral RfD is equivalent to a cancer risk of 1.5E-2. This cancer risk is orders of magnitude above the EPA (1990) risk management range of 1E-6 to 1E-4, strengthening the position that noncancer effects are unlikely to be the driver for the Group B2 PAHs.

Data regarding the toxicity of acute oral exposure to the PAHs are generally scarce. Prolonged oral exposure to the Group D PAHs is associated with a number of renal, hematologic and other effects, depending on the compound.

Subchronic (90 day) gavage treatment of mice with acenaphthene is associated with histopathologic evidence of liver hypertrophy. A verified RfD of 6E-2 mg/kg-day for chronic oral exposure was derived from the NOAEL of 175 mg/kg-day and an uncertainty factor of 3000 (EPA, 2010). The LOAEL in this study was 350 mg/kg-day. Confidence in the RfD is low. The liver is considered the target organ for prolonged oral exposure to acenaphthene. EPA (1997) derived a provisional subchronic oral RfD for acenaphthene of 6E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

A verified RfD of 3E-1 mg/kg-day for chronic oral exposure to anthracene was derived from a NOEL of 1000 mg/kg-day, the highest dose tested, in a 90-day gavage study in mice (EPA,

2010). An uncertainty factor of 3000 was applied. Confidence in the RfD is low. The data are inadequate to identify a target organ for prolonged oral exposure to anthracene. EPA (1997) derived a provisional subchronic oral RfD for anthracene of 3E+0 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Subchronic exposure to fluoranthene induces liver and kidney effects and hematologic alterations in orally treated mice (EPA, 2010). A verified RfD of 4E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 125 mg/kg-day in a 13-week gavage study. The LOAEL was 250 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The kidney, liver and blood cells are chosen as the target organs for prolonged oral exposure to fluoranthene. EPA (1997) derived a provisional subchronic oral RfD for fluoranthene of 4E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Subchronic exposure to fluorene induces hemolytic anemia in orally treated mice (EPA, 2010). A verified RfD of 4E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 125 mg/kg-day in a 13-week gavage study. The LOAEL was 250 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The erythrocyte is the target organ for prolonged oral exposure to fluorene. EPA (1997) derived a provisional subchronic oral RfD for fluorene of 4E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Single-dose LD_{50} values for naphthalene include 533 to 710 mg/kg for mice and 2200 to 2400 mg/kg for rats, establishing the mouse as more sensitive to the lethal effects of acute oral exposure (ATSDR, 1995b). Decreased terminal body weights, accompanied by a remarkable absence of hematological and histopathological effects, were observed in rats treated by gavage for 13 weeks (EPA, 2010). The LOAEL in this study was 142 mg/kg-day associated with greater than 10 percent reduction in terminal body weights. The NOAEL was 71 mg/kg-day. The high dose rate, 286 mg/kg-day was a FEL associated with increased mortality. Application of an uncertainty factor of 3000 (10 to extrapolate from rats to humans, 10 to protect sensitive humans, 10 to extrapolate from subchronic to chronic exposure, and 3 for database deficiencies) to the NOAEL of 71 mg/kg-day yields the verified chronic oral RfD of 2E-2 mg/kg-day. Confidence in the RfD is low. A preliminary subchronic oral RfD can be derived for naphthalene by applying an uncertainty factor of 300 to the NOAEL of 71 mg/kg-day described above. The uncertainty factor of 300 reflects the chronic uncertainty factor of 3000 without the factor of 10 to expand from subchronic to chronic exposure. The preliminary subchronic oral RfD so derived is 2E-1 mg/kg-day.

The key study described above is not sufficient to identify target organs for prolonged oral exposure to naphthalene. Adults, children and neonates exposed to moth balls exhibit hemolytic anemia, evidence of liver disease and neurological deficits (EPA, 1993a, 1998). The liver effects and neurological deficits may be secondary to hemolytic anemia and reduced oxygen-carrying capacity of the blood. Hemolytic anemia and cataract formation have been seen also in orally exposed humans (EPA, 1998). The data suggest that the erythrocyte may be the most sensitive tissue in humans. Among common species of laboratory mammals, hemolytic anemia is seen only in dogs (EPA, 1998). Cataracts are seen in several laboratory mammals, but only at relatively high doses. The key study identifies reduced body weight as the critical effect in rats. Rats, however, do not exhibit hemolytic anemia, and exhibit cataracts only at very high doses,

suggesting that rats may not be a totally acceptable model for the toxicity of naphthalene to humans. Therefore, based on the effects observed in humans, the erythrocyte and eye are selected as target organs for prolonged oral exposure to naphthalene. Reduced body weight is also included as a critical effect because this was the only endpoint observed in rats in the key study.

EPA (1993a, 2010) reported a 2-year study in which mice were exposed to naphthalene vapors for 6 hours/day on 5 days/week. Inflammation of the nasal and olfactory epithelium was the most consistently observed sign; granulomatous lesions in the lungs were also observed. There was equivocal evidence of hematologic involvement. The lowest exposure concentration, 10 ppm, was a LOAEL for the nasal effects, which are considered the critical effects of inhalation exposure. The LOAEL is equivalent to a human equivalent concentration of 9.3 mg/m^3 (EPA, 2010). Application of an uncertainty factor of 3000 yields a verified chronic inhalation RfC of 3E-3 mg/m^3, which is equivalent to a chronic inhalation RfD of 8.6E-4 mg/kg-day. The nasal and olfactory epithelia are the target organs for inhalation exposure to naphthalene. Confidence in the RfC is medium. The chronic inhalation RfC of 3E-3 mg/m^3, equivalent to an inhalation RfD of 8.6E-4 mg/kg-day, is adopted as sufficiently protective for subchronic inhalation exposure as well.

Subchronic exposure to pyrene induces mild renal tubular degeneration and reduced kidney weight in orally treated mice (EPA, 2010). A verified RfD of 3E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 75 mg/kg-day in a 13-week gavage study. The LOAEL was 125 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The kidney tubule is chosen as the target organ for chronic oral exposure to pyrene. EPA (1997) derived a provisional subchronic oral RfD for pyrene of 3E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Data regarding prolonged oral exposure are not available for several of the Group D PAHs, which hinders estimation of an RfD or RfC and compromises evaluation of the potential for noncancer effects. Therefore, surrogates are used to develop toxicity values for the noncancer effects.

Generally surrogates are chosen on the basis of the following hierarchy:

- Toxicological similarity (effects and dose-response relationship).
- Toxicokinetic similarity, assuming that likeness in absorption, distribution and especially products of biotransformation suggests toxicological similarity.
- Structural similarity, assuming that likeness in structure suggests similarity in toxicokinetics.

Selection of defensible surrogates for the PAHs is compromised because toxicological and toxicokinetic data are virtually non-existent (except for benzo[a]pyrene), and the structural similarities often are not very convincing, which imparts a great deal of uncertainty to the effort. Therefore, the most defensible approach for some of the PAHs is to select the most conservative surrogate; i.e., the PAH with the smallest verified oral RfD, which happens to be pyrene.

Data regarding the effects of chronic or subchronic exposure to acenaphthylene were not located in the available literature. Acenaphthene is adopted as a reasonable surrogate for acenaphthylene based on structural similarity, since the surrogate differs from the principal chemical only in the presence of two hydrogen atoms and the absence of a double bond. Therefore, the verified chronic oral RfD of 6E-2 mg/kg-day for acenaphthene is adopted as the RfD for chronic oral exposure to acenaphthylene. The liver, which is the target organ for acenaphthene, is adopted for oral exposure to acenaphthylene. Similarly, the provisional subchronic oral RfD of 6E-1 mg/kg-day for acenaphthene is adopted as the RfD for subchronic oral exposure to acenaphthylene.

Data regarding the effects of chronic or subchronic exposure to benzo(g,h,i)perylene were not located in the available literature. Pyrene is adopted as a reasonable surrogate for benzo(g,h,i)perylene based somewhat on structural similarity, but more on the selection of a conservative approach as justified above. Therefore, the verified oral RfD of 3E-2 mg/kg-day for pyrene is adopted as the oral RfD for chronic exposure to benzo(g,h,i)perylene. Similarly, the provisional subchronic oral RfD of 3E-1 mg/kg-day for pyrene is adopted as the RfD for subchronic oral exposure to benzo(g,h,i)perylene. The kidney tubule, which is the target organ for pyrene, is adopted for oral exposure to benzo(g,h,i)perylene.

Relevant data regarding chronic or subchronic exposure to phenanthrene were not located. Potential surrogates based on similarity in chemical structure include anthracene and pyrene. Pyrene is selected as the surrogate only because it is the more conservative choice. Therefore, the verified oral RfD of 3E-2 mg/kg-day for pyrene is adopted as the oral RfD for chronic exposure to phenanthrene. Similarly, the provisional subchronic oral RfD of 3E-1 mg/kg-day for pyrene is adopted as the RfD for subchronic oral exposure to phenanthrene. The kidney tubule, which is the target organ for pyrene, is adopted for oral exposure to phenanthrene.

Data regarding inhalation exposure sufficient for development of inhalation RfCs were not located for any of the PAHs with the exception of naphthalene as noted above.

6.0 Carcinogenicity Evaluation

Acenaphthylene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, phenanthrene and pyrene are classified in EPA cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) because of a lack of human data and inadequate animal data (EPA, 2010). Data regarding the carcinogenicity of acenaphthene were not located. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, , chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene are classified in EPA weight-of-evidence Group B2 (probable human carcinogens) (EPA, 1997, 2010). Benzo(a)pyrene is the most extensively studied member of the class, inducing tumors in tissues at the point of contact of practically all laboratory species tested by all routes of exposure.

Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans, the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures (ATSDR, 1995a). In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke and coke oven emissions accounted for only 0.1-8% of the total mutagenic activity in *Salmonella* of the unfractionated complex mixture (Lewtas, 1988). Aromatic amines, nitrogen heterocyclic compounds, highly oxygenated quinones, diones,

and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounts for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Furthermore, coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans (ATSDR, 1995a).

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups is based largely on the results of animal studies with large doses of purified compound (EPA, 2010). Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Although the carcinogenicity of benzo(a)pyrene in animals managed in an unnatural manner in laboratory conditions has been well established, the potential for carcinogenicity to humans in environmental settings involving exposure to low concentrations remains unclear.

EPA (200) verified a SF for oral exposure to benzo(a)pyrene of 7.3E+0 per mg/kg-day, based on several dietary studies in mice and rats. Recent reevaluations of the carcinogenicity and mutagenicity of the Group B2 PAHs suggest that there are large differences between individual PAHs in cancer potency (Krewski et al., 1989). Based on the available cancer and mutagenicity data, and assuming that there is a constant relative potency between different potential carcinogens across different bioassay systems and that the PAHs under consideration have similar dose-response curves, EPA (1993b) adopted relative potency values for several PAHs. These values and the corresponding oral SFs, based on a relative potency for benzo(a)pyrene of 1.0, are presented below:

Relative Potency Estimates for PAHs				
			Inhalation	
PAH	Relative Potency	Oral Slope Factor (per mg/kg-day)	Unit Risk Factor (per µg/m^3)	Slope Factor (per mg/kg-day)
Benzo(a)pyrene	1.0	7.3E+0	8.8E-4	3.1E+0
Benzo(a)anthracene	0.1	7.3E-1	8.8E-5	3.1E-1
Benzo(b)fluoranthene	0.1	7.3E-1	8.8E-5	3.1E-1
Benzo(k)fluoranthene	0.01	7.3E-2	8.8E-6	3.1E-2
Chrysene	0.001	7.3E-3	8.8E-7	3.1E-3
Dibenz(a,h)anthracene	1.0	7.3E+0	8.8E-4	3.1E+0
Indeno(1,2,3-cd)pyrene	0.1	7.3E-1	8.8E-5	3.1E-1

Although the EPA has not verified SFs for Group B2 PAHs other than benzo(a)pyrene, the SFs above represent reasonable estimates based on the data available. The relative potency approach employed here meets criteria considered to be desirable for this type of analysis (Lewtas, 1988). For example, the chemicals compared have similar chemical structures and would be expected to have similar toxicokinetic fate in mammalian systems. In addition, the available data suggest that the Group B2 PAHs have a similar mechanism of action, inducing frameshift mutations in *Salmonella* and tumor initiation in the mouse skin painting assay. Similar noncancer effects (minor changes in the blood, liver, kidneys) of the Group D PAHs support the hypothesis of a common mechanism of toxicity. Finally, the same endpoints of toxicity, i.e., potency in various cancer assays, and related data, were used to derive the relative potency values (Krewski et al., 1989). The oral SF for benzo(a)pyrene of 7.3E+0 per mg/kg-day, and the SFs presented above for the other Group B2 PAHs are adopted for the purposes of this evaluation.

An EPA (1994) evaluation of the inhalation cancer data suggests adoption of an inhalation SF for benzo(a)pyrene of 3.1E+0 per mg/kg-day, based on the incidence of upper respiratory and digestive tract tumors in hamsters. Applying the relative potency estimates presented above yield the inhalation URFs and SFs for the other Group B2 PAHs presented above.

EPA (2010) classified naphthalene in EPA cancer weight-of-evidence group C – possible human carcinogen – based on benign respiratory tumors and one carcinoma in female mice exposed to naphthalene by inhalation. Cancer potency factors are not available because the data are not sufficient.

7.0 Toxicity Summary

Toxicity values for the PAHs are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Acenaphthene										
6E-1	6E-2	L	ND	ND	NA	ND	NA	ND	NA	NA
Acenaphthylene										
6E-1	6E-2	L	ND	ND	NA	D	NA	D	NA	NA
Anthracene										
3E+0	3E-1	ND	ND	ND	NA	D	NA	D	NA	NA
Benzo(a)anthracene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Benzo(a)pyrene										
ND	ND	NA	ND	ND	NA	B2	7.3E+0	B2	8.8E-4	3.1E+0
Benzo(b)fluoranthene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Benzo(k)fluoranthene										
ND	ND	NA	ND	ND	NA	B2	7.3E-2	B2	8.8E-6	3.1E-2
Benzo(g,h,i)perylene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA
Chrysene										
ND	ND	NA	ND	ND	NA	B2	7.3E-3	B2	8.8E-7	3.1E-3
Dibenz(a,h)anthracene										
ND	ND	NA	ND	ND	NA	B2	7.3E+0	B2	8.8E-4	3.1E+0
Fluoranthene										
4E-1	4E-2	L,K,B	ND	ND	NA	D	NA	D	NA	NA
Fluorene										
4E-1	4E-2	E	ND	ND	NA	D	NA	D	NA	NA
Indeno(1,2,3-cd)pyrene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Naphthalene										
2E-1	2E-2	E, Ey, BW	3E-3/ 8.6E-4	3E-3/ 8.6E-4	Ne, Oe	C	ND	C	ND	ND
Phenanthrene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA
Pyrene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: B = blood cells; BW = reduced body weight; E = erythrocyte; Ey = eye; L = liver; K = kidney; Ne = nasal epithelium; Oe = olfactory epithelium.
[a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.

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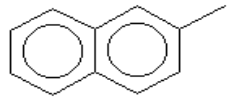
METHYLNAPHTHALENES



2-Methylnaphthalene

1.0 Introduction and Physical Properties

The methylnaphthalenes are the simplest alkylated polyaromatic hydrocarbons (PAH). Two monomethylnaphthalene isomers are possible: 1-methylnaphthalene (occasionally incorrectly called 4-methylnaphthalene) (90-12-0) and 2-methylnaphthalene (91-57-6). A commercial preparation of mixed isomers (1321-94-4) is mentioned (ATSDR, 2005; HSDB, 2010), but the proportion of the individual isomers was not reported. Both 1- and 2-methylnaphthalene are **VOCs**. 1-Methylnaphthalene occurs as a colorless liquid in the pure form at ambient temperatures (HSDB, 2010). 2-Methylnaphthalene reportedly occurs as a solid, but the melting point is 34.6 °C (approximately 94 °F), indicating that at high ambient temperatures the compound would occur as a liquid.

1-Methylnaphthalene is a component of petroleum and a product of incomplete combustion (HSDB, 2010). The compound is also used as a chemical intermediate and a general solvent. 2-Methylnaphthalene is used as an intermediate in organic chemical synthesis, as a dye carrier, in the manufacture of pesticides, as an adjuvant in pesticide formulations, and, in its pure form, in the manufacture of vitamin K. 2-Methylnaphthalene also is a component of crude oil and a product of combustion, which is produced and released to the environment during natural fires. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
1-Methylnaphthalene (90-12-0)										
142.19[a]	3.87[a]	5.14E-4[a] (25°C)	3.36[a]	6.97E-2[b] (25°C)[c]	8.08E-6[b] (25°C)[c]	8.82E-5[a] (25°C)	2.58E+1[a] (25°C)	515[d]	772[d]	1.37E+4[d]
2-Methylnaphthalene (91-57-6)										
142.20[a]	3.86[e]	5.18E-4[e] (25°C)[c]	3.60[ae]	6.97E-2[b] (25°C)[c]	8.08E-6[b] (25°C)[c]	7.24E-5[a] (25°C)	41.4E+1[e] (25°C)	514[d]	761[d]	1.08E+4[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K); $H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole); ND = no data.

[a]Hazard Substances Data Bank (HSDB), 2010, National Library of Medicine.
[b]Calculated as described in Introduction to Toxicity Profiles.
[c]Assumed.
[d]National Institute of Standards and Technology (NIST), 2010, *NIST Chemistry WebBook*, on line.
[e] U.S. Environmental Protection Agency (EPA), 2010, *EPISuite electronic database*.

2.0 Environmental Fate and Transport

Emissions from petroleum refining, coal tar distillation, and gasoline and diesel fueled engines are major contributors of methylnaphthalenes to the environment (HSDB, 2010). Because of the widespread use of the methylnaphthalenes in a variety of products, they are also released to the environment in manufacturing effluents, the disposal of waste byproducts, through landfills,

municipal waste water treatment facilities and waste incinerators. Forest fires and uncontrolled combustion are relatively insignificant contributors (ATSDR, 2005).

Based upon their relatively high vapor pressure, the methylnaphthalenes are expected to exist entirely in the vapor phase in ambient air (HSDB, 2010). Direct photolysis of the methylnaphthalenes is likely to occur; however, only aqueous photolysis data are available. Reactions of the methylnaphthalenes with photochemically produced hydroxyl radicals (half-life = 7.4 hours) and ozone (half-life = 29 to 88 days) are likely to be important removal processes in ambient air. The formation of nitro derivatives in night-time air is also likely to be an important removal process for these compounds.

Data regarding the biodegradation of the methylnaphthalenes in soil were not available (HSDB, 2010). However, based upon aqueous screening test data and die-away tests for ground and marine water, the methylnaphthalenes are expected to biodegrade fairly rapidly in soils acclimated to PAHs and at a moderate rate in unacclimated soils. The methylnaphthalenes are not expected to undergo hydrolysis in soils; however, they are expected to undergo direct photolysis in sunlit surface soils. Mobility in soil is likely to be very low. Volatilization from moist soils may be a significant removal mechanism, although it will be attenuated by adsorption.

The methylnaphthalenes will partition from the water column to organic matter contained in sediments and suspended solids (HSDB, 2010). Volatilization is likely to be an important removal process for these compounds. Volatilization half-lives for a model river and model lake were estimated to be 5.5 hours and 5.3 days, respectively. The methylnaphthalenes are expected to degrade rapidly in marine water and waters acclimated to PAHs. Degradation is expected to be less rapid in unacclimated aquatic systems. The methylnaphthalenes are not expected to undergo hydrolysis in water; however, direct photolysis in sunlit waters is likely to be a significant removal process. The direct photolysis half-life for midday, midsummer sunlight at 40˚ N latitude was predicted to be 22 and 54 hours for 1- and 2-methylnaphthalene, respectively, in water solution.

The methylnaphthalenes are not expected to participate significantly in food-chain pathways (ATSDR, 2005; HSDB, 2010); therefore, biotransfer factors are not provided.

3.0 Toxicokinetics

Data regarding the toxicokinetics of the methylnaphthalenes are very limited. Data regarding the toxicokinetics of naphthalene, often used as a surrogate for the methylnaphthalenes, is somewhat more complete.

The observation that inhalation exposure to naphthalene leads to adverse effects in humans suggests that the methylnaphthalenes are also absorbed by the respiratory tract (ATSDR, 2005).

An excretion study with radiolabeled 2-methylnaphthalene in guinea pigs suggests that GI absorption is rapid and nearly complete, as 80 percent of the administered dose of radioactivity was recovered from the urine within 24 hours (ATSDR, 2005).

Data were not located regarding dermal uptake of the methylnaphthalenes. However, serious adverse health effects have been observed in humans dermally exposed to naphthalene, and animal studies show that naphthalene is rapidly and extensively absorbed through the skin, although using soil as the vehicle slows dermal absorption (ATSDR, 2005). These observations suggest that dermal uptake of the methylnaphthalenes may be significant.

Limited distribution data following oral administration of radiolabeled 2-methylnaphthalene to guinea pigs revealed the presence of radioactivity in the liver almost immediately after treatment (ATSDR, 2005). Relatively high levels were located in the gall bladder, liver and kidney, all of which represent excretion. Data from orally administered naphthalene suggests that distribution to adipose tissue is probably substantial, and that the methylnaphthalenes will probably cross the placenta and distribute to milk. As stated above, naphthalene is often used as a surrogate for the methylnaphthalenes because of structural similarity. Similarity in structure implies similarity in physical, chemical, toxicokinetic and toxicological characteristics.

The sole initial step in naphthalene metabolism is oxidation at the 1,2-position to form the epoxide, 1,2-naphthalene oxide (ATSDR, 2005). The epoxide may rearrange spontaneously to form 1- and 2-naphthol, or undergo enzymatic conversion to 1,2-dihydroxy, 1,2-dihydronaphthalene. The epoxide formed in the first step is recognized as an intermediate that reacts with tissue macromolecules inducing toxic effects, particularly in the lung. 1-Naphthol may undergo further oxidation to form 1,4-naphthoquinone, which has also been shown to interact with macromolecules, particularly in the liver. 1,2-Dihydroxy, 1,2-dihydronaphthalene may undergo further oxidation to form 1,2-naphthoquinone or 1,2-dihydroxy-3,4-epoxy-1,2,3,4-tetrahydronaphthalene. 1,2-Naphthoquinone may be the ultimate toxicant associated with naphthalene-induced cataracts. The toxicological significance of 1,2-dihydroxy-3,4-epoxy-1,2,3,4-tetrahydronaphthalene is unclear.

The presence of the methyl group on 1- or 2-methylnaphthalene may greatly alter the metabolic scheme for these chemicals compared with naphthalene. Data are available only for 2-methylnaphthalene, but the metabolism of 1-methylnaphthalene may be similar. The predominant pathway of 2-methylnaphthalene metabolism involves stepwise oxidation of the methyl group to form 2-hydroxymethylnaphthalene and 2-naphthoic acid, possibly through the aldehyde intermediate (ATSDR, 2005). This pathway accounts for 50 to 80 percent of 2-methylnaphthalene, depending on the species. The end products of this pathway are conjugated with glycine or glucuronic acid and excreted. Ring epoxidation at the 3,4-, 5,6- or 7,8- positions accounts for 15 to 20 percent of 2-methylnaphthalene. These epoxides may be subject to conjugation or may be further oxidized to form the corresponding dihydrols and other derivatives, which in turn undergo conjugation. Experiments with mice suggest that glutathione conjugation may be an important detoxication mechanism. Although data regarding the biological activity of methylnaphthalene metabolites is not as complete as data regarding the biological activity of the naphthalene metabolites, the differences in the metabolites formed are considerable.

Data regarding excretion of the methylnaphthalenes is limited to a study of 2-methylnaphthalene in guinea pigs. Approximately 80 percent of the radiolabel from a single oral dose was recovered within 24 hours in the urine; approximately 10 percent was recovered from the feces. Conjugated metabolites of the products of methyl group oxidation accounted for approximately 76 percent of

the recovered radioactivity. Approximately 18 percent of the recovered radiolabel represented epoxidation at the 7,8- positions.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly (50 percent) less than complete. Therefore, no GAF is developed for the methylnaphthalenes and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

Data were not located regarding the dermal uptake of the methylnaphthalenes from soil. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of the methylnaphthalenes from soil is not evaluated. t*, K_p, τ, FA and B values are estimated by the EPA (2004) method as follows:

Chemical	t*	K_p	τ	FA	B
1-Methylnaphthalene	1.58	9.08E-2	0.657	1	0.42
2-Methylnaphthalene	1.58	8.94E-2	0.657	1	0.41
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Data regarding the effects of human exposure to 1-methylnaphthalene were not located. Subchronic and chronic dietary studies with 1-methylnaphthalene in mice suggest that the toxic potency is low. An increased incidence of pulmonary alveolar proteinosis was the only lesion observed in mice treated at a dose rate of 73 mg/kg-day (lowest dose rate tested) in an 81-week study, but not in mice treated at a dose rate of approximately 1200 mg/kg-day (highest dose rate tested) in a 13-week study (EPA, 1998). These observations suggest that duration of exposure is very important in the toxicity of 1-methylnaphthalene. No RfD is identified for 1-methylnaphthalene. Therefore, it is recommended that 2-methylnaphthalene be used as a surrogate and discussed qualitatively in human health risk assessment.

Effects in humans from exposure to low levels of 2-methylnaphthalene appear to be limited to skin irritation and photosensitization (HSDB, 2010). Acute exposure to high levels may induce headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and coma.

EPA (2010) has provided a verified RfD of 4E-3 mg/kg-day based on pulmonary alveolar proteinosis in an 81-week oral study in mice (Murata et al., 1997). The 2-methylnaphthalene was administered at various dose levels in food. A statistically significant increase in the critical effect was observed in the lowest dose administered (50.3/54.3 mg/kg-day [female/male]). A benchmark dose level assuming 5 percent extra risk of pulmonary alveolar proteinosis of 4.7 mg/kg-day, with a 95 percent lower confidence limit of 3.5 mg/kg-day. UF values of 10 each were applied for interspecies differences, intraspecies variation, and database deficiencies for a composite UF of 1,000. Confidence in the RfD is regarded as low (EPA. 2010). No EPA-derived

subchronic oral RfD is available for the methylnaphthalenes. However, a preliminary subchronic oral RfD is assumed to be equal to the chronic RfD.

Data regarding chronic inhalation exposure of humans or animals to 1- or 2-methylnaphthalene were not located in the available literature. EPA (2010) concluded that an RfC cannot be calculated for 2-methylnaphthalene due to inadequate data. Neither were any epidemiological studies or case studies located which examined the potential effects of 1-methylnaphthalene or 2-methylnaphthalene (EPA, 2010). Therefore, no RfC is identified for either compound.

6.0 Carcinogenicity Evaluation

Under EPA's guidelines for carcinogen risk assessment, the database regarding the carcinogenicity of 2-methylnaphthalene in mice and the lack of human carcinogenicity data are inadequate to assess human carcinogenic potential (EPA, 2010). Therefore no oral SF has been idenifed. Although Murata et al., (1997) identified an increased incidence of pulmonary tumors in male mice at the lowest dose, the results of the study did not indicate an increased incidence of tumors at the high dose, nor were increased incidences of tumor observed in female mice. No studies were identified that suggest that inhalation exposure to 2-methylnaphthelene may cause cancer. Therefore, no unit risk has been verified (EPA, 2010). Neither was any information located to suggest that 1-methylnaphthalene is carcinogenic.

7.0 Toxicity Summary

Toxicity values for 1- and 2-methylnaphthalene are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
2E-1	2E-2	Lung	ND	NA	NA	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); NA = not applicable.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

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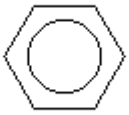
VOLATILE ORGANIC COMPOUNDS

BENZENE (71-43-2)



1.0 Introduction and Physical Properties

Benzene is a naturally occurring **VOC**, present in low levels in many plants and animals, as well as a synthetic compound derived from petroleum (ATSDR, 1997). It occurs as a colorless or slightly yellow liquid, or as a solid at temperatures below approximately 5.5 EC (HSDB, 2010). Benzene is widely used as a solvent and in the manufacturing of other organic compounds such as styrene, phenol, detergents, pesticides, explosives, polychlorinated biphenyls, flavors, perfumes, paints and coatings, nylon intermediates and photographic chemicals, among others. It is also used in food processing and leather tanning and occurs as a component of gasoline. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
78.1[a]	2.13[a]	5.56E-3[b] (25°C)	1.77[b]	8.80E-2[b] (25°C)	9.80E-6[b] (25°C)	1.25E-1[c] (25°C)	1.75E+3[b] (20-25°C)	353.24[d]	562.16[d]	7.34E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);.$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).

[a]U.S. Environmental Protection Agency (EPA), 2004a, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)*, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

[b]U.S. Environmental Protection Agency (EPA), 2001, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Peer Review Draft, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, March.

[c]Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line, accessed 21 April.

[d]U.S. Environmental Protection Agency (EPA), 2003, *Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings*, Office of Emergency and Remedial Response, Washington, DC, 19 June.

2.0 Environmental Fate and Transport

Benzene enters the atmosphere primarily from fugitive emissions and automobile exhaust because of its presence in gasoline (ATSDR, 1997; HSDB, 2010). Other important sources are emissions associated with its production and use as a solvent, as an industrial intermediate in the production of the materials mentioned above, and coke oven blast furnaces and coke by-product recovery plants. In addition, there are discharges into water from industrial effluents and losses during spills. Sources of release to soil include land disposal of benzene-containing wastes, industrial discharge, and leaks from underground storage tanks and associated plumbing.

Benzene released to the atmosphere will exist almost exclusively in the vapor phase (ATSDR, 1997; HSDB, 2010). It is not subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of approximately 13 days. The reaction time in polluted atmospheres containing nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4 to 6 hours. Products of photooxidation include phenol, nitrophenols,

nitrobenzene, formic acid, and peroxyacetyl nitrate. Benzene is fairly soluble in water and is removed from the atmosphere in rain.

Benzene released to soil will be subject to rapid volatilization near the surface; that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater (ATSDR, 1997; HSDB, 2010). Benzene may be subject to biodegradation under aerobic conditions. Microbial transformation proceeds through formation of cis-dihydrodiols to catechols, which lead to destruction of the aromatic ring.

Benzene may be subject to photooxidation and biodegradation in shallow, aerobic groundwaters, but probably not significantly under deeper or anaerobic conditions (ATSDR, 1997; HSDB, 2010). Benzene released to surface water will be subject to rapid volatilization. It is not expected to sorb to sediment or to hydrolyze significantly. Biodegradation is unlikely to be a significant fate process in sediment.

Benzene is not expected to participate significantly in food-chain pathways (ATSDR, 1997; EPA, 1995; HSDB, 2010); therefore, biotransfer factors are not provided.

3.0 Toxicokinetics

Benzene is rapidly and readily absorbed during inhalation exposures of humans or laboratory animals to vapors (ATSDR, 1997). However, the extent of uptake and retention decrease with increasing concentration or time of exposure, reflecting saturation of the metabolic processes that remove the substance from the blood. Excretion data from laboratory animals show that absorption is rapid and essentially complete following oral administration. Dermal uptake of liquid benzene through intact skin has been demonstrated in humans and may be toxicologically significant. The extent of dermal uptake of benzene vapor has not been quantified in humans, but experiments in laboratory animals suggest this exposure route also may be toxicologically significant.

Benzene is widely distributed following any route of exposure (ATSDR, 1997). Highest levels were located in adipose and other tissues high in fat such as the brain following inhalation exposure. Highest levels following oral administration were located in liver, kidney and bone marrow.

Quantitative aspects of the metabolism of benzene are somewhat species-, exposure route- and dose-dependent (ATSDR, 1997), but certain relevant generalizations pertain. The first metabolic step appears to be cytochrome P-450-catalyzed oxidation of benzene to benzene epoxide in the liver, which rearranges to phenol. Phenol is transformed to hydroxyquinone, which is further oxidized to benzoquinone, considered to be a major toxicant in bone marrow. Alternatively, phenol may be further oxidized to catechol and possibly to trihydroxybenzene. Phenol and all its derivatives except benzoquinone have been shown to undergo detoxication by conjugation with glucuronide or sulfate, followed by excretion.

A second general pathway involves the further oxidation of benzene oxide to benzene dihydrodiol, which leads to ring-opening and the formation of muconic dialdehyde, a known hematotoxin, primarily in the liver (ATSDR, 1997).

Absorbed benzene is excreted through the lungs as unchanged compound, and through the urinary tract as conjugated metabolites (ATSDR, 1997). Urinary excretion predominates.

Nothing in this review of toxicokinetics suggests that laboratory animals would not serve as appropriate models for the toxicity of benzene to humans.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Therefore, no GAF is developed for benzene and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

As mentioned above, benzene in the liquid and vapor form are absorbed through the skin (ATSDR, 1997). Combining benzene with soil slows dermal uptake. EPA (2004) notes that VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels. Therefore, dermal uptake of benzene from soil is not evaluated. EPA (2003) provides t*, K_p, τ, B and FA values as follows:

Chemical	t*	K_p	τ	FA	B
Benzene	0.70	1.5E-2	0.29	1	0.1
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Short-term exposure to benzene induces central nervous system (CNS) effects such as drowsiness, dizziness and headaches; long-term exposure may induce anemia (ATSDR, 1997). Oral dosing in animals induces hematopoietic and immune effects. EPA (2010) verified a chronic oral RfD of 4E-3 mg/kg-day, based on hematological effects (reduced lymphocyte count) in a cross-sectional occupational study of 44 workers exposed to benzene. The workers were exposed for 0.7 to 16 years, with a mean of 6.3 years. Because the mean fell below 7 years, the minimal length considered to be chronic, the study is judged to be subchronic in duration. The control group consisted of an equal number of age- and gender-matched unexposed workers. The exposed workers were divided into two equal groups of 22: those exposed to airborne concentrations below and those exposed to airborne concentrations above the median concentration for all workers of 99 mg/m^3. An exposure-adjusted benchmark concentration (BMC) for minimal hematologic effects of 8.2 mg/m^3 was estimated. Assuming that uptake from the respiratory tract is approximately 50 percent of that from the GI tract allowed application of inhalation-to-oral extrapolation to estimate a benchmark dose (BMD) of 1.2 mg/kg-day. Application of an uncertainty factor of 300 to the BMD yielded the verified chronic oral RfD of 4E-3 mg/kg-day. The uncertainty factor of 300 consists of factors of 3 each for extrapolation from a BMC for minimal adverse effects to a BMC for no adverse effects, to expand from subchronic to chronic exposure, and to reflect deficiencies in the data base; a factor of 10 was used to provide additional protection for more sensitive human subpopulations. The blood cells (specifically inhibited hematopoiesis) are the target for prolonged oral exposure to benzene. Confidence in the chronic oral RfD is medium.

A preliminary subchronic oral RfD can be developed from the BMD described above. The subchronic oral RfD is derived by applying an uncertainty factor of 100 to the BMD of 1.2 mg/kg-day. The uncertainty factor of 100 reflects the uncertainty factor of 300 developed by EPA (2010) without the factor of 3 to expand from subchronic to chronic exposure. The preliminary subchronic oral RfD so derived is 1.2E-2 mg/kg-day, which is rounded to 1E-2 mg/kg-day.

A verified chronic inhalation RfC of 3E-2 mg/m^3 for benzene was based on the exposure-adjusted BMC of 8.2 mg/m^3 in the occupational exposure study from which the oral RfD values were derived (EPA, 2010). Application of the uncertainty factor of 300 (as described for the verified chronic oral RfD) to the BMC of 8.2 mg/m^3 yielded the chronic RfC of 3E-2 mg/m^3. The RfC is equivalent to an inhalation RfD of 8.6E-3 mg/kg-day. Confidence in the chronic inhalation RfC is medium. The blood cells (specifically inhibited hematopoiesis) are the target for prolonged inhalation exposure to benzene. A preliminary subchronic inhalation RfC can be derived by application of an uncertainty factor of 100 to the BMC of 8.2 mg/m^3 in the same manner as was done to derive the subchronic oral RfD. The subchronic inhalation RfC so derived is 8.2E-2 mg/m^3, rounded to 8E-2 mg/m^3. The preliminary subchronic inhalation RfC is equivalent to an inhalation RfD of 2.3E-2 mg/kg-day.

6.0 Carcinogenicity Evaluation

Benzene is classified as an EPA cancer weight-of-evidence Group A chemical – a known human carcinogen for all routes of exposure based upon convincing human evidence as well as supporting evidence from animal studies (EPA, 2010). Epidemiologic studies and case studies provide clear evidence of a causal association between exposure to benzene and acute nonlymphocytic leukemia, and also provide supportive evidence for chronic nonlymphocytic leukemia and chronic lymphocytic leukemia. Other neoplastic conditions in humans that are associated with benzene exposure include hematologic neoplasms, blood disorders such as preleukemia and aplastic anemia, Hodgkin's lymphoma, and myelodysplastic syndrome. Experimental animal data add to the weight of evidence that exposure to benzene increases the risk of cancer in multiple species at multiple organ sites (hematopoietic, oral and nasal, liver, forestomach, preputial gland, lung, ovary, and mammary gland). A verified URF range for inhalation exposure of 2.2E-6 to 7.8E-6 per µg/m^3 was based on the incidence of leukemia in humans exposed to benzene while employed in the Pliofilm industry (EPA, 2010). A low-dose linearity model utilizing maximum likelihood estimates was used to estimate the URF. The range reflects differences in the exposure assumptions estimated from the study. EPA (2010) concluded that neither any specific URF value nor either end of the range is more defensible than the other. Therefore, the upper end of the range, 7.8E-6 per µg/m^3, is conservatively selected for this evaluation. The URF of 7.8E-6 per µg/m^3 is equivalent to an inhalation SF of 2.7E-2 per mg/kg/day.

The occupational data that serve as the basis for the inhalation URF also serve as the basis for a verified oral SF for benzene (EPA, 2010). The inhalation URF range was mathematically converted to an equivalent oral SF range by applying standard inhalation rate and body weight assumptions, and by adjusting for route-specific differences in absorption as described for the chronic oral RfD derivation. The oral SF range so derived is 1.5E-2 to 5.5E-2 per mg/kg-day.

The upper end of the range, 5.5E-2 per mg/kg-day, is conservatively selected as the oral SF for this evaluation.

7.0 Toxicity Summary

Toxicity values for benzene are summarized as follows:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1E-2	4E-3	Bc	8E-2/ 2.3E-2	3E-2/ 8.6E-3	Bc	A	5.5E-2	A	7.8E-6	2.7E-2

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day).
Target organ abbreviations: Bc = blood cells.
[a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

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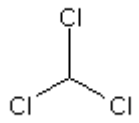
CHLOROFORM (67-66-3)



1.0 Introduction and Physical Properties

Chloroform is a **VOC** that occurs as a clear, colorless, heavy volatile liquid at ambient temperatures (HSDB, 2010). It occurs naturally in the environment, being made by certain forms of algae, seaweed, and the ecological community in peat bogs. Chloroform has been used as a solvent or extraction solvent, dry cleaning fluid, in fire extinguishers, and as an intermediate in the manufacture of dyes and pesticides (ATSDR, 1997). Major current uses include organic synthesis, particularly fluorocarbon-22. It is also formed in the chlorination of drinking water. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
119.4[b]	1.97[a]	3.67E-3[b] (25°C)	1.60[b]	1.04E-1[b] (25°C)	1.00E-5[b] (25°C)	2.59E-1[c] (25°C)	7.92E+3[b] (20-25°C)	334.32[d]	536.40[d]	6.99E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point of pure liquid compound (°K); T_c = critical temperature (°K);)$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).
data.
[a]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July.
[b]U.S. Environmental Protection Agency (EPA), 2001, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Peer Review Draft, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, March.
[c]Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line, accessed 9 January.
[d]U.S. Environmental Protection Agency (EPA), 2003, ***Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings***, Office of Emergency and Remedial Response, Washington, DC, 19 June.

2.0 Environmental Fate and Transport

Chloroform has been shown to occur naturally in the environment, and its release to the atmosphere from tropical oceans amounts to hundreds of thousands of tons per year (HSDB, 2010). Chloroform also enters the environment associated with its use as an industrial solvent, extractant and chemical intermediate as well as from its inadvertent production in the chlorination of drinking water, municipal sewage and cooling water (ATSDR, 1997; HSDB, 2010). Most environmental releases from industrial uses occur directly to the atmosphere.

Chloroform is expected to exhibit moderate mobility in soil (HSDB, 2010), potentially leaching to groundwater. Volatilization from moist soil surfaces is expected to be an important removal process, given its relatively large Henry's Law constant. Volatilization from dry soil surfaces may also be an important removal process. In one study of chloroform residence time in soils, the compound was found to have a half-life of 0.3 days when applied 1 cm deep into soil, and 1.4

days when applied 10 cm deep. It is classified as a "very short-lived" chemical in soil matrices primarily due to its high volatility. Under normal environmental conditions, chloroform is not expected to undergo biodegradation in soils, although the compound has been shown to be anaerobically degraded by methanogenic bacteria in the presence of a primary substrate such as acetic acid, and even more readily under sulfate reducing conditions.

Chloroform is not expected to adsorb significantly to sediment or suspended solids in water (HSDB, 2010). Volatilization from water surfaces is expected to be the major process for removing chloroform from surface water. Volatilization half-lives for a model river and model lake have been estimated at 1.3 hours and 4.4 days, respectively. A field study found that the volatilization half-life from the Rhine River was 1.2 days, while in a lake located in the Rhine basin the half-life was 31 days. In another study, chloroform from a municipal treatment plant injected into an estuarine arm of Chesapeake Bay entirely disappeared within 4 km in the spring and within 11 km in the winter under ice. The decrease in concentration could not be attributed entirely to dilution. Based on available experimental data, aquatic degradation is not expected to be a major removal process, although the data are somewhat conflicting. Although base-catalyzed hydrolysis of chloroform is expected to occur, the estimated kinetics predict that this will not be an environmentally important degradation process.

Chloroform is expected to exist solely as a vapor in the ambient atmosphere (HSDB, 2010). Vapor-phase chloroform is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 151 days. Data regarding the potential for other mechanisms to play an important role in chloroform removal were not located. It is likely that wet deposition or washout may occur, but volatilization would probably readily return the compound to the atmosphere. The tropospheric half-life for chloroform has been estimated at 3 years.

The relatively low log K_{ow} value for chloroform suggests that its participation in food-chain pathways is unlikely to be significant (HSDB, 2010). Measured values for BCF, as well as the observation that the compound is rapidly metabolized confirm this suggestion (ATSDR, 1997; HSDB, 2010; EPA, 1995). Therefore, biotransfer factors are not derived for chloroform.

3.0 Toxicokinetics

Several toxicokinetic studies in animals and humans suggest that chloroform is virtually completely absorbed from the GI tract (ATSDR, 1997). Peak blood levels were higher and attained more quickly from an aqueous vehicle than from an oleaginous vehicle. Although several physiological factors (blood/air partition coefficient, ventilation rate, cardiac output, total body weight and fat content) influence the kinetics of uptake from the respiratory tract, generally arterial blood concentrations are directly proportional to the exposure concentration, suggesting that uptake occurs readily, particularly at concentrations below the saturation point. Experiments with humans indicate that dermal uptake of chloroform in water or ethanol readily occurs.

Absorbed chloroform is rapidly and widely distributed throughout the body, readily crossing the blood-brain and placental barriers (ATSDR, 1997). Highest levels are located in tissues with higher fat content, including adipose tissue, nervous system and liver.

Excretion data suggest that chloroform metabolism is quite species-dependent. Following oral dosing with radiolabeled compound, monkeys excreted most of the dose as unchanged compound in expired air, mice excreted most of the dose as carbon dioxide, and rats excreted both unchanged compound and carbon dioxide (HSDB, 2010). Urinary metabolites included urea (probably formed from carbon dioxide).

The predominant pathway for chloroform metabolism involves the generation of phosgene in the liver, kidney and other tissues as an intermediate in the formation of carbon dioxide (ATSDR, 1997). Phosgene is a toxicant in its own right, combining covalently with microsomal proteins to disrupt cellular integrity and induce necrosis. Humans appear to be less efficient than laboratory rodents in metabolizing chloroform to phosgene, suggesting that a comparable dose might be less toxic to humans. Trihalomethanes as a group are metabolized to carbon monoxide by most species as a result of reductive dechlorination and hydrolysis (ATSDR, 1997; HSDB, 2010). This, however, represents a relatively minor metabolic pathway, and chloroform is somewhat less efficient in forming carbon monoxide than the other trihalomethanes. Carbon monoxide is also toxic, resulting in the formation of carboxyhemoglobin, which is incapable of releasing oxygen to the tissues and transporting carbon dioxide from the tissues.

The routes and kinetics of chloroform excretion depend on the species, percent of body fat, route of exposure and dose. Excretion occurs primarily as carbon dioxide or unchanged compound via exhaled air; minor metabolites are eliminated through the urine and, to a lesser extent, the feces.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Therefore, no GAF is developed for chloroform and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

A hypothetical dermal absorption rate of 29.7 mg/minute was modeled for human hands immersed in liquid chloroform, based on absorption data measured in mice (ATSDR, 1997). Data were not located for dermal uptake from soil. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of chloroform from soil is not evaluated. t*, K_p, τ, FA and B values are provided by EPA (2004) as follows:

Chemical	t*	K_p	τ	FA	B
Chloroform	1.19	6.8E-3	0.50	1.0	0
t* = Time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Oral or inhalation exposure of animals to chloroform is associated with liver and kidney damage (ACGIH, 1991; ATSDR, 1997; EPA, 2010). The case for kidney effects associated with prolonged oral exposure in humans, however, is equivocal. In humans, acute inhalation exposure

to high levels induces narcosis, ventricular fibrillation and death (ACGIH, 1991). Limited occupational data associate chronic exposure to chloroform with CNS depression, digestive disturbances and enlarged livers, but not with olfactory epithelial involvement, which has been seen in laboratory animals.

Chloroform has been the subject of continued investigation and reevaluation because of its nearly ubiquitous nature as an anthropogenic chemical and the potential for widespread exposure. An earlier EPA (2004b) evaluation derived a chronic oral RfD of 1E-2 mg/kg-day based on a LOAEL for fatty cyst formation in the livers and biochemical evidence of liver damage in a 1979 study in which dogs were treated orally for 7.5 years. An uncertainty factor of 1000 was applied. In this dog study, the chemical was given orally in a toothpaste base in gelatin capsules in an effort to test the long-term effects of chloroform in toothpaste. Confidence in this earlier oral RfD was medium to low. The liver was considered the target organ for chronic oral exposure to chloroform.

Other studies analyzed in a recent reevaluation include a 1995 drinking water study in mice, a 1995 gavage study in rats, and a 2000 drinking water study in rats. Subtle effects on the kidney appear to be the critical effects of prolonged exposure in rodents. The liver lesions in the 1979 dog study remain the more sensitive endpoint of chloroform exposure and the more appropriate basis for an oral RfD. EPA (2010) developed a benchmark dose limit associated with a 10 percent extra risk for the liver lesions and biochemical evidence described above ($BMDL_{10}$) of 1.2 mg/kg-day. Application of an uncertainty factor of 100 and rounding to one significant figure yields the more recently verified oral RfD of 1E-2 mg/kg-day. The uncertainty factor of 100 consists of factors of 10 each for inter- and intra-species variation. Confidence in the new oral RfD is medium; slightly higher than the level of confidence in the earlier derivation because the BMDL approach is considered somewhat more reliable than the LOAEL/NOAEL approach to RfD development. The rodent studies provide sufficient information to identify both the liver and the kidney as target organs for prolonged oral exposure to chloroform.

Previously, EPA (1997a) adopted the earlier chronic oral RfD of 1E-2 mg/kg-day as the provisional RfD for subchronic oral exposure. As noted above, the earlier chronic oral RfD derivation has been revised, although the value of the RfD remains the same. Therefore, the new verified chronic oral RfD of 1E-2 mg/kg-day is adopted as sufficiently protective for subchronic exposure, but EPA (1997a) is no longer cited as the source.

Prolonged inhalation exposure of rats is associated with atrophy of the ethmoid epithelium at concentrations lower than those associated with liver or kidney effects (EPA, 1997b, 2003). An earlier provisional subchronic inhalation RfC was derived from a 13-week intermittent exposure study in rats based on effects on the ethmoid epithelium. More recently, EPA (2003) determined that atrophy of the nasal epithelium in rats is not an appropriate model for human toxicity, in part because this effect has not been observed in humans. The effects on the liver and kidney appear consistently to be the critical effects in humans following inhalation or oral exposure. Subchronic studies in rats and mice showed that mice were somewhat more sensitive than rats to these effects.

A large study of B6C3F1 strain mice was conducted in which groups of 15 mice of each sex were exposed to chloroform in air at concentrations of 0 (control), 0.3, 2, 10, 30 or 90 ppm on 6 hours per day, 7 days per week, for a total of 13 weeks (EPA, 2003). Other groups of 13 to 15

mice of each sex were exposed to 10 or 90 ppm 6 hours per day, 5 days per week, for a total of 13 weeks to see if there were differences between exposure on 5 or 7 days per week in the intensity of the response. Still other groups of 5 to 13 female mice were exposed to 0, 0.3, 2, 10, 30 or 90 ppm on 6 hours per day for 4, 21 or 42 continuous days to investigate the time-course development of chloroform-induced liver lesions. Finally, groups of 8 mice of each sex were exposed to 30 or 90 ppm 6 hours per day for 6 weeks followed by a 6-week recovery period in which they were held without exposure, to test the reversibility of the liver and kidney effects.

Kidney lesions were observed only in the male mice exposed to 30 or 90 ppm chloroform (EPA, 2003). There appeared to be little difference between mice exposed on 5 days per week and those exposed for 7 days per week. The kidney lesions did not appear to be reversible, at least during the 6-week recovery period afforded certain groups. Liver lesions were observed in both male and female mice exposed to 30 or 90 ppm chloroform. Severity was greater in those exposed on 7 days per week compared with those exposed on 5 days per week. The liver lesions appeared to be largely reversible during the 6-week recovery period. This study identified 10 ppm as the NOAEL and 30 ppm as the LOAEL for liver and kidney effects in mice. However, a "labeling index" was slightly increased in the kidneys of male mice exposed to 10 ppm. The labeling index suggests that chloroform metabolites may have bound to macromolecules in the kidney cells at levels below those with discernable pathological change. A smaller study in BDF1 mice identified 5 ppm as a NOAEL and 30 ppm as the LOAEL for kidney and liver effects in a second strain of mice.

EPA (2003) chose the 5 ppm NOAEL in mice described above as the basis for developing subchronic and chronic RfCs for chloroform. The 5 ppm concentration, equivalent to 25 mg/m^3, was adjusted to a human equivalent concentration for continuous exposure of 4.5 mg/m^3. Application of an uncertainty factor of 100 yields a provisional inhalation RfC, rounded to one significant figure, of 5E-2 mg/m^3. The uncertainty factor consists of a factor of 10 to provide additional protection to unusually sensitive members of the population, and factors of 3 each to account for physiological differences between mice and humans, and to reflect uncertainty about the data base. The major uncertainty surrounds the potential for neurological effects to occur at levels lower than the NOAEL for kidney and liver effects. The provisional RfC is equivalent to 1.4E-2 mg/kg-day. The provisional RfC is appropriate for either subchronic or chronic exposure, because the large study in B6C3F1 mice did not indicate increased incidence or severity of effects with increased duration of exposure. The liver and kidney are the target organs for prolonged inhalation exposure to chloroform. Confidence in the RfC is low to medium.

6.0 Carcinogenicity Evaluation

The carcinogenicity of chloroform has recent undergone reevaluation and updating on the IRIS record (EPA, 2010). Chloroform was formerly classified as a cancer weight-of-evidence Group B2 compound (probable human carcinogen), based on increased incidence of several tumor types in rats and liver tumors in mice. Human carcinogenicity data are inadequate. A verified oral SF of 6.1E-3 per mg/kg-day was derived from the incidence of kidney tumors in rats treated with chloroform in drinking water for two years. A verified inhalation URF of 2.3E-5 per ug/m^3, developed in 1987, was based on the incidence of hepatocellular carcinomas in mice treated by gavage for 78 weeks. The inhalation URF is equivalent to 8.1E-2 per mg/kg-day.

The more recent cancer evaluation describes chloroform *as likely to be carcinogenic to humans by all routes of exposure under high-exposure conditions that lead to cytotoxicity and regenerative hyperplasia in susceptible tissues (i.e., liver and kidney)* (EPA, 2010). On the other hand, chloroform is unlikely to be carcinogenic to humans by any route of exposure under exposure conditions that do not cause cytotoxicity and cell regeneration. Chloroform appears to exert its carcinogenicity through epigenetic mechanism(s) that are inoperative unless cellular damage in susceptible tissues is sufficient to result in cell regeneration. Since there are thresholds for cytotoxicity, the carcinogenic expression of chloroform is generally assessed as a threshold phenomenon. In other words, the chronic oral RfD of 1E-2 mg/kg-day is considered to be sufficiently protective against carcinogenicity by oral or dermal exposure, and the inhalation RfC of 5E-2 mg/m^3 (1.4E-2 mg/kg-day) is considered to be sufficiently protective against carcinogenicity for inhalation exposure. It should be noted that the previously verified oral SF has been removed from the IRIS record. The previously verified inhalation URF still appears on the IRIS record, but it is preceded by the caveat that it is based on a 1987 evaluation and does not incorporate newer data or reflect updated cancer assessment guidelines. The inhalation carcinogenicity assessment is currently under revision (EPA, 2010).

In most cases it is not necessary to evaluate the carcinogenicity of chloroform using either the oral or inhalation SFs described above, because the noncancer effects would drive decision-making. In fact, it would be inappropriate to base selection of chloroform as a chemical of concern, or to develop remedial goal options for chloroform, based on cancer risk. However, it may be useful to estimate the cancer risk associated with chloroform for the baseline condition. This could be done using the oral and inhalation SFs described above, but it should only be done if the route-specific exposure dose on a daily basis exceeds the route-specific RfD.

7.0 Toxicity Summary

Toxicity values for chloroform are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfc/ sRfD	cRfC/ cRfD	TO	WOE	SFo	WOE	URFi	SFi
1E-2	1E-2	L, K	5E-2/ 1.4E-2	5E-2/ 1.4E-2	L, K	See Section 6	ND[b]	See Section 6	ND[b]	ND[b]

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ abbreviations: L = liver; K = kidney.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.
[b]Chloroform is determined to be a threshold carcinogen more appropriately evaluated by the RfD and RfC values derived for protection against threshold phenomena.

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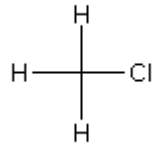
CHLOROMETHANE (METHYL CHLORIDE) (74-87-3)



1.0 Introduction and Physical Properties

Chloromethane is a **VOC** that exists as a colorless gas at ambient temperatures (HSDB, 2010). It is used largely as a methylating agent in the production of silicones, tetramethyl lead, methyl cellulose, methylene chloride, methyl mercaptan, plastics, pesticides, pharmaceuticals, dyes, perfumes, ethers, resins, agricultural chemicals, quaternary amines and butyl rubber (ACGIH, 1991; ATSDR, 1998; HSDB, 2010). It is also used as an extractant for fats, oils and resins, as a blowing agent and as a refrigerant. It was formerly used as a propellant in various aerosol products. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
50.5[a]	0.91[a]	8.82E-3[b] (25□C)	1.15[b]	1.39E-1[c] (25□C)[d]	1.49E-5[e] (20□C)	5.66E+0[b] (25□C)	5.32E+3[b] (25 □C)	247[f]	416[f]	5.15E+3[f]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);,.$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).

[a]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July.

[b]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.

[c]Calculated as described in Introduction to Toxicological profiles.

[d]Assumed.

[e]Montgomery, J.H., 1996, ***Groundwater Chemicals Desk Reference, Second Edition***, Lewis Publishers, New York, pp. 664-666.

[f]National Institute of Standards and Technology (NIST), 2010, ***NIST Chemistry WebBook***, on line.

2.0 Environmental Fate and Transport

Chloromethane is one of the few halogenated organic chemicals for which natural sources are significant. Natural sources include volcanoes, volatilization from plants, and forest fires (HSDB, 2010). It is produced in seawater by the reaction of methyl iodide with chloride ions. Methyl iodide is produced photosynthetically by several marine organisms, and there may be other oceanic sources as well. The mean air flux of 1.3E-6 g/cm^2-year for the eastern Pacific Ocean, when extrapolated to global waters, provides an adequate source to explain the atmospheric reservoir of chloromethane. Chloromethane is released from brush and forest fires. The estimated 0.6 g of chloromethane released per kg of vegetation burned is believed to make a significant impact on the global burden of the compound.

The production and many uses of chloromethane may result in its release to the environment through various waste streams (HSDB, 2010). It is also released in tobacco smoke and turbine exhaust. Just as forest fires contribute to natural sources, wood burning, field burning, and backyard burning also contribute to atmospheric burdens. Chloromethane is formed in the chlorination of drinking water and sewage effluent, and is found in the effluent of some publically owned treatment works.

Most chloromethane is released to the atmosphere where it is expected to exist solely as a gas (HSDB, 2010). Gas-phase chloromethane is degraded in the atmosphere by reaction with

photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 310 days, which provides opportunity for widespread dispersion. The dominant process for removal from the troposphere is upward diffusion, although washout by rain may also be important. From the tropopause to about 30 km, both upward diffusion and reaction with hydroxyl radicals will be of approximately equal importance, and above 30 km in the stratosphere, diffusion, reaction with hydroxyl radicals, and photodissociation will have approximately equal importance. The surface half-life resulting from upward diffusion is approximately 80 days.

Based on its very low estimated K_{oc} value, chloromethane is expected to have very high mobility in soil (HSDB, 2010). Its relatively high water solubility suggests the compound released in sufficient quantity in the liquid phase or dissolved in water could leach readily to groundwater. Volatilization from moist soil surfaces is expected to be an important removal process for small quantities released to the surface. Volatilization from dry soil surfaces may also be important. Field and laboratory studies demonstrate that several halogenated aliphatics may biodegrade slowly under anaerobic conditions, but not under aerobic conditions. Biodegradation is not expected to be a significant removal process.

Chloromethane is not expected to adsorb to suspended solids and sediment in surface water (HSDB, 2010). Volatilization from water surfaces is expected to be a significant removal mechanism; volatilization half-lives for a model river and model lake are 46 minutes and 3 days, respectively. Field and laboratory studies demonstrate that several halogenated aliphatics may biodegrade slowly under anaerobic conditions, but not under aerobic conditions. Biodegradation is not expected to be a significant removal process. Hydrolysis may occur, but very slowly, with a half-life of approximately 2 years (ATSDR, 1998). Hydrolysis will not be a significant removal process for chloromethane in surface water, but may be the only significant removal process for the compound in groundwater, where it has been shown to persist.

Chloromethane is water soluble, volatile and labile, and is not expected to participate significantly in food-chain pathways (ATSDR, 1998; HSDB, 2010). Therefore, biotransfer factors are not estimated for this compound.

3.0 Toxicokinetics

Studies regarding the toxicokinetics of chloromethane are limited to inhalation exposure. Chloromethane is readily absorbed by the respiratory system and equilibrium conditions are reached in approximately one hour in exposed humans and laboratory animals (ATSDR, 1998). Data regarding the extent of respiratory absorption were not located. Although data were not located for GI absorption, it is expected that GI absorption would be rapid and extensive because the compound is a low MW organic substance that is readily absorbed by the respiratory system. HSDB (2010) stated that dermal absorption can occur, but no other information was provided.

Radioactivity is rapidly and extensively distributed throughout the body following inhalation exposure to radiolabeled chloromethane, with highest levels of radioactivity measured in liver, kidney, testis and lung (ATSDR, 1998). Approximately 20 percent of the radiolabel in liver and testis was found to have been metabolically incorporated into the cellular structure, reflecting uptake and utilization from the one-carbon atom pool of the body.

The primary and predominant metabolic pathway of chloromethane involves enzymatic conjugation with glutathione to form S-methylglutathione (ATSDR, 1998). Further metabolism involves deamination to yield S-methylcysteine and other sulfur-containing conjugation derivatives, which are excreted in the urine. Another metabolic pathway involves dehalogenation of chloromethane to form formaldehyde (a toxicant in its own right) and formic acid. These intermediates contribute to the one-carbon atom pool that is available for incorporation into the tissues or for mineralization to carbon dioxide followed by excretion through the lungs.

Studies have shown that adult humans, unlike laboratory animals, may be divided into two groups – fast or slow metabolizers – depending on the activity in their erythrocytes of glutathione-S-transferase, which is responsible for the first conjugation reaction (ATSDR, 1998). Fast metabolizers clear chloromethane from the body more rapidly than slow metabolizers. Whether the unborn, new born or young children exhibit this characteristic is unknown. The implications of glutathione-S-transferase activity regarding population differences in toxic potency are unclear. On the one hand, it may appear that fast metabolizers should be more tolerant of chloromethane because of their enhanced ability to clear the compound from the body. On the other hand, experiments in laboratory animals suggest that a metabolite of S-methylglutathione may be the ultimate toxicant, in which case fast metabolizers may be more sensitive to chloromethane toxicity.

Chloromethane residues are rapidly cleared from the body following the cessation of inhalation exposure (ATSDR, 1998). Clearance in laboratory animals and humans is biphasic, consistent with a linear 2-compartment model. The half-lives for both phases were measured in minutes, indicating the rapidity with which clearance occurs. The exception is that the β-phase in some humans (slow metabolizers) approximated 1.5 hours.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Chloromethane is assumed to be absorbed readily from the GI tract; therefore, no GAF is developed.

Data regarding the dermal uptake of chloromethane were not located, except that HSDB (2010) stated that dermal absorption could occur. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of chloromethane from soil is not quantified. EPA (2004a) provides t*, K_p, τ, FA and B values as follows:

Chemical	t*	K_p	τ	FA	B
Chloromethane	0.49	3.3E-3	0.20	1	0
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Data regarding the toxicity of oral exposure to chloromethane consist of the statement that liver effects were not observed in rats given a single oral dose of 420 mg/kg (ATSDR, 1998; EPA, no date). EPA (no date) derived a provisional chronic oral RfD of 4E-3 mg/kg-day based on a LOAEL of 69.32 mg/m^3 for subtle neurobehavioral effects from an occupational (inhalation) study. Subsequently, EPA (2010) reviewed the data and determined that ingestion exposure is not applicable because the compound exists as a gas at ambient temperatures. They also noted that the oral exposure data are insufficient to develop an oral RfD. Therefore, the EPA (no date) derivation is considered to be not applicable and no oral RfD is offered herein.

EPA (2010) verified a chronic inhalation RfC of 9E-2 mg/m^3 based on a NOAEL of 50 ppm (103.2 mg/m^3) from an 11-day continuous exposure study in mice. The NOAEL corresponds to a human equivalent concentration (HEC) of 94.6 mg/m^3. The LOAEL in this study, 100 ppm (206.4 mg/m^3 or a HEC of 189.2 mg/m^3) was associated with slight to moderate degenerative changes in the granule cells of the cerebellum. EPA (2010) applied an uncertainty factor of 1000 to the NOAEL HEC of 94.6 mg/m^3 to derive the RfC of 9E-2 mg/m^3. The uncertainty factor consists of factors of 10 each to provide additional protection for unusually sensitive humans and to expand from a short-term to lifetime exposure, and factors of 3 each to extrapolate from mice to humans and to address the uncertainty regarding the potential for CNS effects in the developing young. Confidence in the verified chronic inhalation RfC is medium. The verified inhalation RfC is equivalent to an inhalation RfD of 2.6E-2 mg/kg-day. The CNS is the target organ for prolonged inhalation exposure to chloromethane.

EPA (1996) developed a provisional chronic RfC based on subtle neurobehavioral effects from an occupational (inhalation) study. They adopted the provisional chronic RfC for subchronic application, noting no significant differences in response between chronic and subchronic exposure. However, given the EPA (2010) reevaluation and verification of a more conservative chronic RfC, it is deemed prudent to adopt the verified chronic RfC rather than the provisional chronic RfC as sufficiently protective for subchronic exposure.

6.0 Carcinogenicity Evaluation

Previous EPA (1997, 1998) evaluations classified chloromethane in EPA weight-of-cancer Group C (possible human carcinogen), and developed an oral SF and an inhalation URF. More recently, EPA (2010) reevaluated the data, noting that chloromethane is a naturally occurring compound, and concluded that it is more appropriately classified in Group D (not classifiable as to its human carcinogenicity). Applying more recent cancer assessment guidelines, EPA (2010) concluded that the available data suggest that chloromethane would be classified as an agent whose carcinogenic potential *cannot be determined*. Previously developed potency factors are considered to be not applicable; no potency factors are offered herein for chloromethane.

7.0 Toxicity Summary

Toxicity values for chloromethane are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
			9E-2/	9E-2/						

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
ND	ND	NA	2.6E-2	2.6E-2	CNS	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: CNS = central nervous system.

8.0 References

Agency for Toxic Substances and Disease Registry (ATSDR), 1998, ***Update Toxicological Profile for Chloromethane***, U.S. Department of Health and Human Services, Atlanta, GA, December, on line.

American Conference of Governmental Industrial Hygienists (ACGIH), 1991, ***Documentation of the Threshold Limit Values and Biological Exposure Indices***, Sixth Edition, Cincinnati, OH, pp. 953-957.

Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.

U.S. Environmental Protection Agency (EPA), no date, ***Risk Assessment Issue Paper for: Derivation of a Provisional RfD for Chloromethane (CASRN 74-87-3)***, National Center for Environmental Assessment, Cincinnati, OH.

U.S. Environmental Protection Agency (EPA), 1996, ***Risk Assessment Issue Paper for: Derivation of a Provisional Chronic and Subchronic RfC for Chloromethane (CASRN 74-87-3)***, National Center for Environmental Assessment, Cincinnati, OH, 23 July.

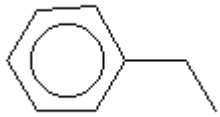
U.S. Environmental Protection Agency (EPA), 1997, ***Health Effects Assessment Summary Tables, FY 1997 Update***, Office of Solid Waste and Emergency Response, Washington, DC, 9200.6-303(97-1), EPA 540/R-97-036, PB97-921199.

U.S. Environmental Protection Agency (EPA), 1998, ***Draft Risk Assessment Issue Paper for: Updating the Quantitative Carcinogenicity Evaluation of Chloromethane (CASRN 74-87-3)***, National Center for Environmental Assessment, Cincinnati, OH, 18 December.

U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*** Final, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July.

U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

ETHYLBENZENE (PHENYLETHANE) (100-41-4)



1.0 Introduction and Physical Properties

Ethylbenzene, also known as phenylethane, is a **VOC** that exists in the pure state as a colorless liquid at ambient temperatures (HSDB, 2010). It is used primarily as a precursor in the manufacture of styrene (ATSDR, 1999). It is also used as a solvent and diluent, and as an intermediate in the manufacturing of cellulose acetate, rubber and other organic compounds (ATSDR, 1999; HSDB, 2010). It is also a constituent of asphalt, naphtha, and automotive and aviation fuels. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
106.2[a]	3.15[a]	7.88E-3[b] (25°C)	2.56[b]	7.50E-2[b] (25°C)	7.80E-6[b] (25°C)	1.26E-2[c] (25°C)	1.69E+2[b] (20-25°C)	409.34[d]	617.20[d]	8.50E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K); $H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).
[a]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.
[c]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[d]U.S. Environmental Protection Agency (EPA), 2003, ***User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings***, Office of Emergency and Remedial Response, Washington, DC, June 19.

2.0 Environmental Fate and Transport

Ethylbenzene enters the atmosphere primarily from fugitive emissions and exhaust connected with its use in gasoline (ATSDR, 1999; HSDB, 2010). More localized sources to the air and other environmental media include fugitive emissions, waste water and spills from its production and industrial use, leaking underground storage tanks, land disposal of ethylbenzene-containing waste, and municipal and hazardous waste combustion.

Ethylbenzene exists in the air in the vapor phase (ATSDR, 1999; HSDB, 2010). It is somewhat water soluble and may be removed by precipitation; however, it is likely to reenter the air by volatilization. Ethylbenzene is transformed in air by various oxidative processes to yield ethylphenols, benzaldehyde, acetophenone, and m- and p-nitroethylbenzene. Reaction with photolytically generated hydroxyl radicals is probably the most significant reaction, with a half-life estimated to be 55 hours, suggesting that ethylbenzene will not persist in the air or travel long distances.

Ethylbenzene released to soil will volatilize rapidly (ATSDR, 1999; HSDB, 2010). That which infiltrates is expected to be quite mobile in soil and may leach to groundwater because sorption to soil particles is not sufficiently strong to retard movement. Biodegradation in soil in aerobic conditions involves oxidation of the ethyl side chain, ring hydroxylation and ring cleavage, and may be a significant source of removal. Anaerobic degradation is expected to be insignificant.

Ethylbenzene released to surface water will volatilize rapidly to air (ATSDR, 1999; HSDB, 2010). Biodegradation in aerobic conditions will significantly reduce water-borne concentrations. Photolysis and hydrolysis are unlikely to be significant. Ethylbenzene partitions weakly to sediment.

Ethylbenzene is not expected to participate significantly in food-chain pathways (ATSDR, 1999; EPA, 1995; HSDB, 2010); therefore, biotransfer factors are not provided.

3.0 Toxicokinetics

Ethylbenzene is rapidly absorbed during inhalation exposure, with retention near or exceeding 50 percent of the inhaled concentration (ATSDR, 1999). The compound is similarly rapidly absorbed following oral administration. Excretion data in rabbits suggest that a minimum of 72 to 92 of an oral dose is absorbed. Liquid ethylbenzene applied to the skin of humans is rapidly absorbed, but ethylbenzene vapor is poorly absorbed.

Ethylbenzene appears to be efficiently and widely distributed throughout the body following inhalation exposure (ATSDR, 1999). The same is expected following oral and dermal exposure, but data are lacking.

Metabolism in humans of absorbed ethylbenzene following either inhalation or oral exposure predominantly involves successive oxidation of the ethyl side-chain through 1-phenylethanol, acetophenone, ω-hydroxyacetophenone, and 1-phenyl-1,2-ethanediol to form mandelic acid and phenylglyoxylic acid (ATSDR, 1999). Small quantities of the first 4 intermediates are conjugated and excreted in the urine. Mandelic acid and phenylglyoxylic acid are excreted without conjugation and comprise the majority of excreted metabolites. A minor metabolic pathway involves epoxide formation and hydroxylation of the phenyl ring with or without oxidation of the ethyl group to yield small quantities of metabolites that are conjugated and excreted. Experiments with laboratory animals reveal species differences in the predominance of certain metabolites, but the pathways described above appear to hold. There is no evidence that the metabolites are more toxic than the parent compound.

Excretion of metabolites, primarily through the urine, is rapid and extensive in humans and laboratory animals (ATSDR, 1999). Pulmonary excretion of carbon dioxide is a minor pathway.

Nothing in this review of toxicokinetics suggests that laboratory animals would not serve as appropriate models for the toxicity of ethylbenzene to humans.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. GI absorption of ethylbenzene is extensive as discussed in Section 3.0. Therefore, no GAF is developed for ethylbenzene and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

Data were not located for dermal uptake of ethylbenzene from soil. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels

(EPA, 2004). Therefore, dermal uptake of ethylbenzene from soil is not evaluated. Values for t*, K_p, τ, FA and B are provided by EPA (2004) as follows:

Chemical	t*	K_p	τ	FA	B
Ethylbenzene	1.01	4.9E-2	0.42	1.0	0.2
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

An oral LD_{50} in rats of 5.46 g/kg (HSDB, 2010) suggests that the acute toxicity of ingested ethylbenzene is low. Subchronic to chronic oral exposure of laboratory animals to ethylbenzene induces mild liver and kidney lesions (EPA, 2010). EPA (2010) presents a verified chronic oral RfD for ethylbenzene of 1E-1 mg/kg-day based on a NOEL for liver and kidney lesions in female rats of 136 mg/kg-day in a six-month gavage study. The LOAEL in this study was 408 mg/kg-day. An uncertainty factor of 1000 was applied to the NOEL to derive the chronic oral RfD. The uncertainty factor consists of factors of 10 each to extrapolate from animals to humans, to provide additional protection for more sensitive humans, and to expand from subchronic to chronic exposure. Confidence in the oral RfD is low. The liver and kidney are the target organs for prolonged oral exposure to ethylbenzene.

No EPA-derived subchronic oral RfD is available for ethylbenzene. A preliminary subchronic oral RfD can be made, however, by applying an uncertainty factor of 100 to the NOEL of 136 mg/kg-day in the 6-month rat study described above. The uncertainty factor of 100 reflects the chronic uncertainty factor of 1000 without the factor of 10 for expansion from subchronic to chronic exposure. The preliminary subchronic oral RfD so derived is 1E+0 mg/kg-day.

Acute inhalation exposure induces irritation of the mucous membranes in animals and humans (ACGIH, 1991). Prolonged inhalation exposure induces liver enzymes and results in elevated liver and kidney weights; prolonged exposure to relatively high levels is associated with mild histopathological lesions of the liver, kidney and testes (ACGIH, 1991; EPA, 2010). EPA (2010) considered that the effects on the liver at the lower exposure concentrations are adaptive rather than adverse. EPA (2010) presented a verified chronic inhalation RfC of 1E+0 mg/m^3 derived from a human equivalent adjusted NOAEL of 434 mg/m^3 from studies on developmental effects in rats and rabbits. An uncertainty factor of 300 was used. The human equivalent adjusted LOAEL of 4340 mg/m^3 was associated with equivocal evidence of reduced fetal size in rabbits, an increased incidence of extra ribs in rat fetuses, and increased liver, kidney and spleen weights in the rats. The inhalation RfC is equivalent to 2.9E-1 mg/kg-day. Confidence in the RfC is low. The chronic inhalation RfC is adopted as being sufficiently conservative for subchronic as well as chronic inhalation exposure.

The key study from which the inhalation RfC is derived does not clearly identify target organ(s) for inhalation exposure to ethylbenzene. The entire inhalation exposure data base, however, suggests that the liver, kidneys and fetus may be the most significant target organs for prolonged inhalation exposure.

6.0 Carcinogenicity Evaluation

Ethylbenzene is currently verified as a cancer weight-of-evidence Group D compound (not classifiable as carcinogenicity to humans) (EPA, 2010) based on an absence of human or animal cancer studies. Cancer potency factors are not estimated for Group D compounds.

7.0 Toxicity Summary

Toxicity values for ethylbenzene are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1E+0	1E-1	L, K	1E+0/ 2.9E-1	1E+0/ 2.9E-1	L, K, F	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); NA = not applicable.
Target organ or critical effect abbreviations: L = liver; K = kidney; F = fetus.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

Agency for Toxic Substances and Disease Registry, (ATSDR), 1999, ***Update Toxicological Profile for Ethylbenzene***, U.S. Department of Health and Human Services, Atlanta, Georgia, July, on line.

American Conference of Governmental Industrial Hygienists (ACGIH), 1991, ***Documentation of the Threshold Limit Values and Biological Exposure Indices***, Sixth Edition, Cincinnati, OH, p. 581-584.

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U.S. Environmental Protection Agency (EPA), 1995, "Final Water Quality Guidance for the Great Lakes System; Final Rule," (40 CFR 9, 122, 123, 131, and 132), ***Federal Register***, 60(56): 15365-15425.

U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*** Final, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July.

U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

METHYLENE CHLORIDE (DICHLOROMETHANE) (75-09-2)

1.0 Introduction and Physical Properties

Methylene chloride is a **VOC** used predominantly as a paint remover and as a solvent and flammability depressant in aerosol products such as coatings, paint removers, hair sprays, room deodorants, herbicides and insecticides (ATSDR, 2000; HSDB, 2010). Methylene chloride is also used in the foam blowing of polyurethanes, in metal degreasing, stripping and degreasing of electronic components, in resin production, photographic film splicing, adhesive production, and other solvent, cleaning and thinning applications. It occurs as a colorless liquid at ambient temperatures. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
84.9[a]	1.25[a]	3.25E-3[e] (25EC)	1.07[b]	1.01E-1[b] (25EC)	1.17E-5[b] (25EC)	5.72E-1[c] (25EC)	1.30E+4[b] (20-25EC)	313.0[d]	510.0[d]	6.71E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry□s Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point of pure liquid compound (EK); T_c = critical temperature (EK); $\Delta H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole); ND = no data.[a]U.S U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, NTIS No. PB99-963312, July.

[b]U.S. Environmental Protection Agency (EPA), 2001, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Peer Review Draft, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, March.
[c]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[d] U.S. Environmental Protection Agency (EPA), 1997, ***User□s Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings***, prepared by Environmental Quality Management, Inc. for the Office of Emergency and Remedial Response, Washington, DC, September.
[e]U.S. Environmental Protection Agency (EPA), 2010, *EPISuite electronic database*.

2.0 Environmental Fate and Transport

Methylene chloride is highly volatile; therefore, most environmental releases are to the atmosphere (ATSDR, 2000; HSDB, 2010). Large amounts (greater than a hundred million pounds) are released each year during its industrial and consumer use. Methylene chloride exists solely as a vapor in air and may travel long distances before removal. It is subject to reaction with photochemically generated hydroxyl radicals with a half-life of a few months. It is also subject to direct photolysis.

Methylene chloride released to soil will be highly mobile and will infiltrate or leach to greater depths or to groundwater (ATSDR, 2000; HSDB, 2010). Some will also volatilize. Methylene chloride released to water will be rapidly lost primarily by volatilization. It is not expected to partition to sediment. It is subject to hydrolysis and biodegradation, but these processes are less significant than volatilization. Methylene chloride is not expected to participate significantly in food-chain pathways; therefore, biotransfer factors are not provided.

3.0 Data for Evaluating Dermal Exposure

Animal studies indicate that methylene chloride is readily absorbed from the GI tract (ATSDR, 2000). EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Therefore, no GAF is developed for methylene chloride and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of methylene chloride from soil is not evaluated. K_p, τ, FA and B values are provided by EPA (2001) as follows:

Chemical	K_p	τ	FA	B
Methylene chloride	3.5E-3	0.32	1.0	0

K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).

4.0 Noncancer Effects Evaluation

Oral LD_{50} values in rats and mice approximate 2 g/kg, suggesting that the acute toxicity of methylene chloride is moderate (ATSDR, 2000). Prolonged oral exposure induces liver lesions in laboratory animals. EPA (2010) verified an RfD for chronic oral exposure of 6E-2 mg/kg-day by applying an uncertainty factor of 100 to a NOAEL of about 6 mg/kg-day in a two-year drinking water study in rats. The LOAEL, about 55 mg/kg-day, was associated with histopathologic lesions in the liver. Confidence in the RfD is medium. EPA (1997) adopted the verified chronic oral RfD of 6E-2 mg/kg-day as the provisional RfD for subchronic oral exposure.

Occupational exposure to high concentrations of methylene chloride is associated with a wide variety of neurological dysfunctions and elevated blood levels of carbon monoxide (a metabolite of methylene chloride) and carboxyhemoglobin (ACGIH, 1991). Chronic inhalation exposure of laboratory animals induces liver effects. EPA (1997) derived a provisional chronic inhalation RfC of 3E+0 mg/m^3 based on a NOAEL of 695 mg/m^3 in a two-year intermittent exposure study in rats. ATSDR (2000) lists a chronic inhalation minimum risk level (MRL) of 0.3 ppm. A concentration analogous to an RfC can be calculated if this MRL is multiplied by the ratio of the molecular weight of methylene chloride (84.9) to the average molecular weight of air (~29). This result in an "RfC" of 9E-1 mg/m^3. This is equivalent to an inhalation RfC of 0.3 mg/kg-day. The values are also used for subchronic exposure.

5.0 Carcinogenicity Evaluation

Methylene chloride is classified in EPA cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate human data and sufficient evidence of carcinogenicity in animals (EPA, 2010). Animal inhalation studies showed increased incidence of hepatocellular neoplasms and alveolar/bronchiolar neoplasms in male and female mice, mammary tumors in rats of either sex, salivary gland sarcomas in male rats and leukemia in female rats. Oral studies were inconclusive. An oral SF of 7.5E-3 per mg/kg-day was based on the incidence of liver

tumors in two inhalation studies in mice. An inhalation URF of 4.7E-7 per $\mu g/m^3$ was based on the incidence of liver and lung tumors in one inhalation study. The inhalation URF is equivalent to 1.6E-3 per mg/kg-day.

6.0 Toxicity Summary

Toxicity values for methylene chloride are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
6E-2	6E-2	L	9E-1/ 3E-1	9E-1/ 3E-1	L	B2	7.5E-3	B2	4.7E-7	1.6E-3

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URF = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ abbreviations: L = liver; K = kidney; NA = not applicable.
[a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.

7.0 References

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1,1,2,2-TETRACHLOROETHANE (79-34-5)

1.0 Introduction and Physical Properties

1,1,2,2-Tetrachloroethane is a **VOC** that exists in the pure state as a colorless to pale yellow liquid at ambient temperatures (HSDB, 2010). It was once used as a non-flammable solvent in cleaning and degreasing metals, in paint removers, varnishes and lacquers, in photographic film, as an extractant for oils and fats, and as an intermediate in the synthesis of unsaturated chlorinated solvents (ATSDR, 2008; HSDB, 2010). All these uses have declined markedly. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
167.9[a]	2.39[a]	3.67E-4[e] (25 °C)	1.97[b]	7.10E-2[b] (25 °C)	7.90E-6[b] (25 °C)	8.03E-3[c] (25 °C)	297E+3[b] (20-25 °C)	419.60[d]	661.15[d]	9.00E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point of pure liquid compound (°K); T_c = critical temperature (°K); $\Delta H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).

[a]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final***, Office of Superfund Remediation and Technology Innovation, Washington, DC, EPA/540/R/99/005, OSWER 9285.7-02EP, NTIS No. PB99-963312, July.

[b]U.S. Environmental Protection Agency (EPA), 2001, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Review Draft, Office of Solid Waste and Emergency Response, Washington, DC, 9355.4-24, March.

[c]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.

[d]U.S. Environmental Protection Agency (EPA), 1997, ***User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings***, Office of Emergency and Remedial Response, Washington, DC, September.

[e]U.S. Environmental Protection Agency (EPA), 2010, *EPISuite electronic database*.

2.0 Environmental Fate and Transport

Releases of 1,1,2,2-tetrachloroethane include process and fugitive emissions from its production and use as a chemical intermediate and industrial solvent, petroleum refining, incineration of chlorinated solvents, and evaporation from waste water streams (ATSDR, 2008). Most of the released 1,1,2,2-tetrachloroethane enters the atmosphere where it exists solely as a vapor and is very stable (half-life > 2 years) (HSDB, 2010). The chemical eventually diffuses to the stratosphere where it rapidly photodegrades. Wet deposition may remove some 1,1,2,2-tetrachloroethane from air, but volatilization from soil or surface water quickly returns it to the air.

1,1,2,2-Tetrachloroethane released to soil will be highly mobile and will infiltrate or leach to greater depths or to groundwater (ATSDR, 2008; HSDB, 2010). Some will also volatilize. Various hydrolytic, oxidative and biodegradation processes slowly transform the parent compound to 1,1,2-trichloroethane, trichloroethene, dichloroethene and vinyl chloride, all of

which are relatively stable and each of which is a toxicant in its own right. The biotransformation products are also subject to leaching to groundwater.

1,1,2,2-Tetrachloroethane released to water will be lost primarily by volatilization within days to weeks (ATSDR, 2008; HSDB, 2010). The compound is not expected to partition to sediment. Hydrolysis slowly converts the parent compound to trichloroethene.

Theoretical and empirical considerations suggest that participation in food-chain pathways is unlikely to be significant (HSDB, 2010; EPA, 1995); therefore, biotransfer factors are not provided.

3.0 Data for Evaluating Dermal Exposure

ATSDR (2008) summarized several studies that suggest that GI absorption of 1,1,2,2-tetrachloroethane is nearly complete in rats and mice. The most useful study reported excretion in rats and mice given a 150 mg/kg oral dose. Excretion was followed for 72 hours after treatment. Rats excreted 42 percent of the dose in expired air, 23 percent in urine and 4 percent in the feces. Mice excreted 51 percent in the breath, 22 percent in the urine and 6 percent in the feces. These data suggest that a minimum of approximately 95 percent of the oral dose was absorbed in both species, assuming that material recovered from the feces represents unabsorbed compound. EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Therefore, no GAF is developed for 1,1,2,2-tetrachloroethane and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

1,1,2,2-Tetrachloroethane is readily absorbed through the skin (HSDB, 2010), but data regarding the dermal uptake of 1,1,2,2-tetrachloroethane from soil were not located in the available literature. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of 1,1,2,2-tetrachloroethane from soil is not evaluated. K_p, τ, FA and B values are provided by EPA (2004) as follows:

Chemical	K_p	τ	FA	B
1,1,2,2-Tetrachloroethane	6.9E-3	0.93	1.0	0
K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).				

4.0 Noncancer Effects Evaluation

Single dose oral LD_{50} values in rats are grouped at 250 to 800 mg/kg (ATSDR, 2007). It appears that death is due largely to narcosis (probably accompanied by respiratory arrest and/or cardiovascular collapse). Prolonged oral exposure of laboratory animals to 1,1,2,2-tetrachloroethane is associated with liver and kidney effects (ATSDR, 2008).

Acute occupational exposure to high levels is associated with CNS effects; prolonged exposure to more moderate levels is associated with GI disturbances and liver damage (ATSDR, 2008).

The results of numerous subchronic studies were reviewed to derive a subchronic oral pRfD (EPA, 2008) for 1,1,2,2-tetrachloroethane. The lowest LOAEL identified was 40 mg/kg-day, in which increases in liver weights were observed (NTP, 2004). The results of several endpoints from this NTP study were evaluated using benchmark dose modeling, assuming 95% lower confidence limits, to identify potential points of departure to derive a subchronic pRfD. This modeling resulted in the identification of 10.8 mg/kg-day point of departure, based on increases in lever weights of male rats. This value can be regarded as an estimated NOAEL. An oral subchronic pRfD of 1E-2 mg/kg-day was derived by dividing this value by a composite UF of 1,000. This assumes a UF of 10 for each of the following: interspecies variability, intraspecies sensitivity, and deficiencies in the database (EPA, 2008).

Because of deficiencies in chronic animal studies, the subchronic NTP (2004) study used to derive the subchronic pRfD was also selected as the most appropriate to derive a chronic RfD. The chronic oral RfD of 4E-3 mg/kg-day was derived as described for the subchronic RfD, with an additional UF of 3 (for a composite UF of 3,000) to extrapolate from subchronic to chronic duration added to extrapolate from subchronic to chronic exposure for a composite UF of 3,000 (EPA, 2008).

Adequate studies for the derivation of inhalation pRfDs could not be located (EPA 2008)

5.0 Carcinogenicity Evaluation

Oral treatment with 1,1,2,2-tetrachloroethane is associated with a highly significant dose-related increase in hepatocellular carcinomas in rats (ATSDR, 2008). Occupational data regarding carcinogenicity in humans are inadequate. EPA (2010) classified 1,1,2,2-tetrachloroethane as a cancer weight-of-evidence Group C compound (possible human carcinogen), based on liver tumors in mice in a 78-week gavage study in which the test compound was dissolved in corn oil. EPA (2002) verified an oral SF of 2.0E-1 per mg/kg-day from the mouse study. The same data serve as the basis for an inhalation URF of 5.8E-5 per $\mu g/m^3$, which is equivalent to 2.0E-1 per mg/kg-day.

6.0 Toxicity Summary

Toxicity values for 1,1,2,2-tetrachloroethane are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	Sfi
1E-2	4E-3	L	ND	ND	NA	C	2.0E-1	C	5.8E-5	2.0E-1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	Sfi

inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ abbreviations: L = liver; NA = not applicable.
[a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.

7.0 References

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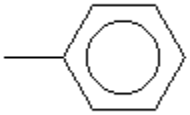
U.S. Environmental Protection Agency (EPA), 2010, ***Integrated Risk Information System (IRIS)***, National Center for Environmental Assessment, Cincinnati, OH, on line.

TOLUENE (METHYLBENZENE) (108-88-3)



1.0 Introduction and Physical Properties

Toluene is a **VOC** that occurs as a colorless liquid at ambient temperatures (HSDB, 2010). It is back-blended into gasoline to improve octane rating, used to produce benzene, used as a solvent in paints, coatings, adhesives, inks and cleaning agents, and used in the synthesis of a wide range of organic chemicals, particularly benzene and its derivatives (ATSDR, 2000; HSDB, 2010). Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
92.1[a]	2.73[a]	6.64E-3[b] (25°C)	2.26[b]	8.70E-2[b] (25°C)	8.60E-6[b] (25°C)	3.74E-2[c] (25°C)	5.26E+2[b] (20-25°C)	383.78[d]	591.79[d]	7.93E+3[d]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K); $H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole); ND = no data.

[a]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final,*** Office of Emergency and Remedial Response, EPA/540/R/99/005, OSWER 9285.7-02EP July.

[b]U.S. Environmental Protection Agency (EPA), 2001, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Peer Review Draft, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, March.

[c]Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line, accessed 23 April.

[d]U.S. Environmental Protection Agency (EPA), 2003, ***Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings***, Office of Emergency and Remedial Response, Washington, DC, 19 June.

2.0 Environmental Fate and Transport

Large amounts of toluene are released into the atmosphere each year, principally from the production, transport and use of gasoline (ATSDR, 2000; HSDB, 2010). Other major sources include volatilization of toluene-based solvents and thinners, and motor vehicle exhaust. Considerable amounts are discharged into waterways or spilled on land during the storage, transport and disposal of fuels and oils. Natural sources include emissions from volcanoes, forest fires and crude oil.

Toluene in the atmosphere will exist predominantly or entirely in the vapor phase, where it is subject to reaction with photochemically produced hydroxyl radicals (ATSDR, 2000; HSDB, 2010). It is also subject to reaction with various oxidizing agents in the atmosphere, but these reactions are far less significant. Wet deposition is another important process for removal of toluene from the atmosphere.

Toluene is expected to be moderately to highly mobile in soil and may leach to groundwater (ATSDR, 2000; HSDB, 2010). Volatilization is an important removal process for toluene near the surface of the soil. Biodegradation may also be significant in soil. Toluene in water will be

lost by both volatilization to the atmosphere and biodegradation. Which process predominates will depend on water temperature, mixing conditions and the existence of acclimated microorganisms at the site. The compound is not expected to sorb significantly to sediment or suspended organic matter in water.

Toluene theoretically may be expected to bioconcentrate because of its lipophilicity, but empirical data show that it is subject to rapid biotransformation, which greatly reduces this tendency (ATSDR, 2000). Overall, biotransfer is not expected to be significant (EPA, 1995) and biotransfer factors are not provided.

3.0 Toxicokinetics

Excretion data from humans and laboratory animals indicate that toluene is rapidly and extensively absorbed during inhalation and following oral administration (ATSDR, 2000). Data from humans suggest that pulmonary retention ranges from 50 to 83 percent of the inhaled concentration. GI absorption is practically complete in humans and animals. Administration of toluene in soil slows the rate but does not reduce the extent of GI absorption. Toluene is absorbed by the skin of humans and laboratory animals when applied as a liquid or as a water solution. Dermal uptake of toluene vapor has been demonstrated in animals. Data were not located regarding dermal uptake from soil.

Absorbed toluene is rapidly and widely distributed throughout the body (ATSDR, 2000). Highest levels are generally found in highly vascular and lipid-rich tissues, including the brain, particularly following inhalation, and the liver, particularly following ingestion. Levels in maternal tissues are generally much higher than those in fetal tissues. The nervous system is an important target for exposure to toluene, particularly following inhalation exposure.

The predominant metabolic pathway for toluene involves oxidation of the methyl group to form benzyl alcohol which is further oxidized to benzoic acid, followed by conjugation with glycine to form hippuric acid, which is recovered as the major urinary metabolite (ATSDR, 2000). A minor pathway involves hydroxylation of the benzene ring to form various cresol isomers, which undergo conjugation and excretion by the kidneys. Another minor pathway involves glutathione conjugation of benzyl alcohol to yield a mercapturic acid urinary metabolite. Quantitative differences in the relevance of these pathways have been shown for different species and different human racial groups.

The liver is the primary site of toluene biotransformation. The enzyme activity involved in toluene metabolism is low in the fetal liver, but reaches adult levels soon after birth. Low levels of detoxication activity in the fetus may increase the likelihood of developmental effects.

Toluene metabolites are rapidly excreted from the body, although excretion appears to be multi-phasic, reflecting release of toluene from adipose depots (ATSDR, 2000).

Nothing in this review of toxicokinetics suggests that laboratory animals would not serve as appropriate models for the toxicity of toluene to humans.

4.0 Dermal Exposure

EPA (2004) notes that organic chemicals are generally well absorbed from the GI tract, and recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. As noted above, GI absorption is practically complete. Therefore, no GAF is developed for toluene and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

Data were not located for dermal uptake of toluene from soil. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of toluene from soil is not evaluated. EPA (2003) provides t*, K_p, τ, B and FA values as follows:

Chemical	t*	K_p	τ	FA	B
Toluene	0.84	3.1E-2	0.35	1.0	0.1
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ= lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Acute inhalation (glue sniffing, solvent abuse, industrial accidents) or ingestion exposure to high levels of toluene induces CNS dysfunction and narcosis (ATSDR, 2000). Acute oral LD_{50} values include 2.6 to 7.5 g/kg in rats (HSDB, 2010), suggesting the acute toxicity is not high. Acute ingestion is associated with lesions in the heart, liver, lungs and kidneys (ATSDR, 2000). Prolonged oral exposure to lower levels is associated with pathological changes in the liver, kidney and brain. Changes in liver and kidney weights were observed in rats treated by gavage for 13 weeks at a dose rate of 446 mg/kg-day (NTP, 1990). Overt kidney effects were observed at higher doses (EPA, 2010). A NOAEL of 223 mg/kg-day was also observed in this NTP study.

EPA (2010) derived a verified chronic RfD for toluene, using the benchmark dose approach and the LOAEL of 446 mg/kg-day. The critical effect of absolute kidney weight was used. This approach derived a benchmark dose level of 238 mg/kg-day as the point of departure. The RfD of 8E-2 mg/kg-day is derived by dividing this value by a composite UF of 3000. This assumes a UF of 10 for each of the following: interspecies variability, intraspecies sensitivity, and subchronic to chronic extrapolation. An additional UF of 3 was added to account for deficiencies in the data base (EPA, 2010). The chronic RfD is also conservatively used for subchronic exposure.

Prolonged occupational (inhalation) exposure to toluene at concentrations near 100 ppm induces upper respiratory tract irritation and CNS dysfunction (EPA, 2010). The CNS effects are selected as the critical endpoint for a verified inhalation RfC of 5 mg/m^3. EPA (2010) considered a plethora of human studies in the derivation of this RfC. It is based on an average adjusted NOAEL from several studies of 46 mg/m^3 (EPA, 2010). An RfC of 5 mg/m^3 is derived from this value by dividing by a UF of 10 to account for inter-individual variability. This value equals an inhalation RfD of 1.4 mg/kg-day.

6.0 Carcinogenicity Evaluation

EPA (2010) verified toluene as a cancer weight-of-evidence Group D compound (not classifiable as to carcinogenicity to humans) based on a lack of human data and inadequate animal testing data. Potency factors are not available for Group D compounds.

7.0 Toxicity Summary

Toxicity values for toluene are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
8E-2	8E-2	K,	4E-1/ 1.1E-1	4E-1/ 1.1E-1	CNS	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); NA = not applicable.
Target organ or critical effect abbreviations: K = kidney, CNS = central nervous system.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

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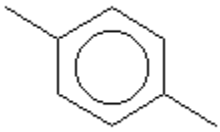
XYLENES (DIMETHYLBENZENE), TOTAL (1330-20-7)



p-Xylene

1.0 Introduction and Physical Properties

The xylenes, also known as dimethylbenzenes, exist as three isomers: 2-xylene (1,2-dimethylbenzene, ortho- or o-xylene) (95-47-6), 3-xylene (1,3-dimethylbenzene, meta- or m-xylene) (108-38-3) and 4-xylene (1,4-dimethylbenzene, para- or p-xylene) (106-42-3) (HSDB, 2010). The o-, m-, and p-xylene nomenclature will be used herein to be consistent with the manner in which xylene concentrations in environmental media are usually reported by the analytical laboratories.

The xylenes are **VOCs** derived from coal tar, coal gas, and petroleum distillation (ATSDR, 1995; HSDB, 2010). They occur as clear liquids in the pure state at most ambient temperatures, although 4-xylene occurs as colorless plates or prisms at temperatures below 56EF (13.33EC). Natural sources include petroleum, forest fires and volatiles from plants.

Xylenes are used in the manufacture of other organic compounds, dyes, insecticides and pharmaceuticals, and as solvents (ATSDR, 1995; HSDB, 2010). They are components of aviation gasoline, asphalt and naphtha, and automobile exhaust. Technical xylene consists of approximately 44 percent m-xylene, 20 percent o-xylene, 20 percent p-xylene, and 15 percent ethylbenzene. Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
o-Xylene (95-47-6)										
106.16[a]	3.12[a]	5.20E-3[b] (25°C)	2.56[b]	8.70E-2[b] (25°C)	1.00E-5[b] (25°C)	8.70E-3[a] (25°C)	1.78E+2[b] (20-25°C)	417.60[c]	630.30[c]	8.66E+3[c]
m-Xylene (108-38-3)										
106.2[d]	3.20[d]	7.34E-3[b] (25°C)	2.61[b]	7.00E-2[b] (25°C)	7.80E-6[b] (25°C)	1.09E-2[a] (25°C)	1.16E+2[b] (20-25°C)	412.27[c]	617.05[c]	8.52E+3[c]
p-Xylene (106-42-3)										
106.16[a]	3.15[a]	7.66E-3[b] (25°C)	2.59[b]	7.69E-2[b] (25°C)	8.44E-6[b] (25°C)	1.16E-2[a] (25°C)	1.85E+2[b] (20-25°C)	411.52[c]	616.20[c]	8.53E+3[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);.$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).

[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.

[b]U.S. U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

[c]U.S. Environmental Protection Agency (EPA), 2000, ***User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings, Revised***, Office of Emergency and Remedial Response, Washington, DC, December.

[d]U.S. Environmental Protection Agency (EPA), 2004a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

It is recommended that the physical properties for m-xylene should be applied to mixed xylene isomers or data where the specific isomer is not identified, because m-xylene is the major component of the technical mixture and is likely to predominate following xylene releases.

2.0 Environmental Fate and Transport

Naturally occurring sources of xylenes are petroleum, forest fires and volatiles from plants (ATSDR, 1995; HSDB, 2010). The production and use of xylenes in petroleum products and as chemical solvents and intermediates may result in their release to the environment as fugitives and through various waste streams. Off-gassing from landfills and automobile exhaust are other significant sources. Spills, leaking underground storage tanks and associated plumbing, and leaching from landfills may release xylenes to soil and groundwater.

Xylenes will exist solely in the vapor phase in the ambient atmosphere, where they are subject to degradation by reaction with photochemically-produced hydroxyl radicals as the only significant removal process (ATSDR, 1995; HSDB, 2010). The atmospheric lifetime of xylenes is about 1 to 2 days. Products of photooxidation include a wide variety of ring hydroxylation and ring cleavage products.

Volatilization is expected to be the major removal mechanism for xylenes released to surface soil, but, depending on the size and rate of release, the majority of the release may infiltrate to subsurface soil (ATSDR, 1995). Photooxidation may degrade a significant part of the small amount that remains at the surface. Biodegradation is probably the only significant subsurface removal mechanism, but it is expected to be slow. A wide range of experimental K_{oc} values have been reported in soil samples with differing pH and organic carbon content (HSDB, 2010), suggesting a wide range in the extent to which the xylenes adsorb to soil particles. Generally, however, xylene is fairly mobile and may readily leach to groundwater.

Volatilization is probably the most significant removal mechanism for xylenes in surface water (ATSDR, 1995). Biodegradation may occur in surface water, groundwater and landfill leachate, although quite slowly. Oxidative reactions are expected to be insignificant. Xylenes are expected to adsorb somewhat to suspended solids and sediment in water (HSDB, 2010).

Xylenes are not expected to participate significantly in food-chain pathways (ATSDR, 1995; HSDB, 2010); therefore, biotransfer factors are not provided.

3.0 Toxicokinetics

Xylenes are rapidly and extensively absorbed during inhalation and following oral exposure (ATSDR, 1995). In humans, approximately 50 to 73 percent of the inhaled concentration is retained. In laboratory animals, approximately 90 percent of an ingested dose is absorbed. Liquid xylene is absorbed through the skin of humans, but dermal uptake of xylene vapors approximates only 1 percent of inhalation uptake. A study in rats showed that dermal uptake of xylene adsorbed to soil is much slower than dermal uptake of the neat liquid.

Absorbed xylene is largely bound to serum protein in the blood and is distributed rapidly and widely throughout the body, but particularly to highly vascular tissues and those high in lipid content (e.g., blood, brain, liver) (ATSDR, 1995). Levels in fetal tissues approximate 2 percent of those measured in maternal brain.

The predominant metabolic pathway in humans and animals for all xylene isomers is oxidation of one of the methyl groups to the corresponding alcohol, with further oxidation to the

corresponding methylbenzoic acid (ATSDR, 1995). The methylbenzoic acids conjugate with glycine to form the corresponding methylhippuric acids, which are the major urinary metabolites. Much lesser quantities of the alcohols and o-methylbenzoic acid are also excreted in the urine. Methylbenzaldehyde, proposed as the ultimate toxicant because it inactivates enzymes involved in electron transport, has been identified in laboratory animals but not in humans. Metabolism in laboratory animals differs from that in humans largely in the nature of the conjugates that are formed. Ring hydroxylation to form phenolic compounds represents a minor metabolic pathway is both humans and animals.

The xylenes are rapidly excreted from the body, largely in the form of urinary metabolites (ATSDR, 1955) as described above. Approximately 5 percent of an oral dose is eliminated in the breath as unchanged compound. Residues are slightly more persistent in adiposa and muscle tissue than other tissues of the body, but no organ or tissue accumulates xylene residues.

4.0 Dermal Exposure

EPA (2003) recommends that oral toxicity values should not be adjusted when used for dermal exposure unless empirical data demonstrate that GI absorption is significantly less than complete. Xylenes are nearly completely absorbed from the GI tract; therefore, no GAF is developed for the xylenes and the oral toxicity values described below should be used for dermal exposure without adjustment for GI absorption.

Xylene in soil is absorbed by the skin, albeit very slowly, but quantitative data were not located. VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels (EPA, 2004). Therefore, dermal uptake of xylenes from soil is not evaluated. Values for t*, K_p, τ, FA and B are provided by EPA (2003) for m-xylene as follows:

Chemical	t*	K_p	τ	FA	B
m-Xylene	1.01	5.3E-2	0.42	1.0	0.2
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

The dermal uptake parameters presented by EPA (2004) for m-xylene are applied to all the xylene isomers as well as to total xylenes.

5.0 Noncancer Effects Evaluation

Oral LD_{50} values for xylenes include 3.5 to 8.6 g/kg in rats and 1.6 to 5.6 g/kg in mice (HSDB, 2010), suggesting that the acute toxicity is low, but that mice may be slightly more sensitive than rats to the acute effects of ingested xylenes. Prolonged oral exposure of animals to xylenes is associated with reduced body weight and survival without histopathological alterations in the internal organs (EPA, 2010). EPA (2010) confirmed a previously verified chronic oral RfD for total xylenes of 2E-1 mg/kg-day based on a NOAEL of 250 mg/kg, equivalent to a continuous dose rate of 179 mg/kg-day, for decreased body weight and survival in male rats in chronic gavage studies with mixed xylenes. The LOAEL was 500 mg/kg, equivalent to 357 mg/kg-day. Mice were also included in the study. The LOAEL in mice was 1000 mg/kg, equivalent to 714 mg/kg-day, associated with hyperactivity, which was consistently observed at 5 to 30 minutes

after treatment. The mice did not exhibit the effects on body weight or survival that was observed with the rats, establishing the rat as the more sensitive species to prolonged oral exposure. An uncertainty factor of 1000 was applied to the rat NOAEL to derive the verified chronic oral RfD. Confidence in the chronic oral RfD is medium.

EPA (1997) presented provisional chronic oral RfDs for o-xylene and m-xylene of 2E+0 mg/kg-day based on an earlier IRIS evaluation of the same rat and mouse gavage study. Given the EPA (2010) re-evaluation of this study and the lowering of the chronic oral RfD by an order of magnitude, it seems prudent to adopt the verified chronic oral RfD of 2E-1 mg/kg-day for use with mixed xylenes and all xylene isomers. The critical effects of prolonged oral exposure to xylenes are reduced body weight and reduced survival. The verified chronic oral RfD is adopted as sufficiently protective for subchronic oral exposure to mixed xylenes and all xylene isomers.

Occupational exposure to xylenes induces CNS effects and GI disturbances (ACGIH, 1991). Other effects attributed to occupational exposure to xylene (blood dyscrasias, and heart, liver and kidney damage) may arise from concurrent exposure to other chemicals. EPA (2010) verified a chronic inhalation RfC of 1E-1 mg/m^3 based on CNS effects. In the key study, male rats were intermittently exposed to m-xylene at airborne concentrations of 0, 50 or 100 ppm for three months. Endpoints evaluated included spontaneous motor activity and motor coordination as measured by performance on a rotorod. Body and organ weights and limited blood chemistry and hematological parameters were also evaluated, but minor alterations in these endpoints were not attributed to exposure to m-xylene. The study identified 50 ppm as the NOAEL and 100 ppm as the LOAEL for impaired rotorod performance. The NOAEL is equivalent to an adjusted human equivalent concentration of 39 mg/m^3. Application of an uncertainty factor of 300 to the NOAEL yields the verified chronic inhalation RfC of 1E-1 mg/m^3, which is equivalent to a chronic inhalation RfD of 2.9E-2 mg/kg-day. The uncertainty factor consists of a factor of 10 to provide greater protection for more sensitive individuals, and factors of 3 each to extrapolate from animals to humans, to expand from subchronic to chronic exposure, and to account for deficiencies in the data base. The CNS is considered to be the target organ for prolonged inhalation exposure to xylenes. Confidence in the chronic inhalation RfC is medium.

No EPA-derived subchronic inhalation RfC is available for exposure to xylene. However, a preliminary subchronic inhalation RfC can be derived by applying an uncertainty factor of 100 to the NOAEL of 39 mg/m^3 in the subchronic rotorod study in rats described above. The uncertainty factor of 100 reflects the chronic uncertainty factor of 300 without the factor of 3 to expand from subchronic to chronic exposure. The preliminary subchronic inhalation RfC so derived is 4E-1 mg/m^3, which is equivalent to a subchronic inhalation RfD of 1.1E-1 mg/kg-day.

6.0 Carcinogenicity Evaluation

Xylene was previously characterized as a cancer weight-of-evidence Group D compound (not classifiable as to carcinogenicity to humans). Using a more descriptive characterization, EPA (2010) concluded that the cancer *data are inadequate for an assessment of the carcinogenic potential of xylenes*. Adequate human data on the carcinogenicity of the xylenes are not available, and the available animal data are inconclusive as to the ability of xylenes to cause a carcinogenic response. Evaluations of the genotoxic effects of xylenes have consistently given negative results. Potency factors are not available.

7.0 Toxicity Summary

Toxicity values for the xylenes are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
2E-1	2E-1	BW, Su	4E-1/ 1.1E-1	1E-1/ 2.9E-2	CNS	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); NA = not applicable.
Target organ or critical effect abbreviations: BW = reduced body weight; Su = reduced survival; CNS = central nervous system.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

Agency for Toxic Substances and Disease Registry (ATSDR), 1995, ***Update Toxicological Profile for Xylenes***, U.S. Department of Health and Human Services, Atlanta, Georgia, August, on line.

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Miscellaneous

CYANIDE ANION (57-12-5), FREE CYANIDE, HYDROGEN CYANIDE (74-90-8)

Cyanide Anion

1.0 Introduction and Physical Properties

The term cyanide is properly used to mean the cyanide anion illustrated above. The term is also used herein to represent any form of cyanide, particularly if the form was not specified in the literature cited. The term free cyanide generally means the cyanide anion, hydrogen cyanide and some cyanide salts (e.g., sodium cyanide, potassium cyanide) that readily dissociate and release cyanide in water solutions within the biological pH range (ATSDR, 2006). Chlorine-amenable cyanide includes free cyanide as well as most organic complexes and most simple metal complexes. The chlorine-amenable fraction excludes iron cyanides, which resist degradation with release of cyanide. Total cyanide includes all of the above.

Concentrations of cyanide reported by various analytical procedures do not necessarily reflect the amount that is bioavailable, and data are not available with which to quantify bioavailability (ATSDR, 2006). Free cyanide and simple water soluble complexes (part of the chlorine-amenable fraction) are expected to be highly bioavailable. More complicated organic complexes and many metal complexes are expected to be somewhat less bioavailable, but the nature of the specific compound and pH of the matrix will greatly influence bioavailability. A reasonably conservative approach (adopted herein) is to evaluate total cyanide in the RA. A more reasonable approach, including only chlorine-amenable cyanide in the RA, might be justified if there were large differences between concentrations of chlorine-amenable and total cyanide. Large differences (upwards of an order of magnitude) might be expected in mining situations where metal complexes are expected to predominate.

Hydrogen cyanide is used in the synthesis of a wide range of organic chemicals (ATSDR, 2006; HSDB, 2010). Cyanide salts are used in metal treatment, ore extraction, as anticaking agents in road salt, and in a wide variety of other uses. Hydrogen cyanide has been used formerly to fumigate grain to control insects and rodents, and to exterminate rodents in their burrows. The cyanide anion is an **inorganic** substance. Hydrogen cyanide is a liquid, or gas above 26.5 EC (HSDB, 2010), and behaves very much like a **VOC** in the environment. Relevant physical properties of inorganic cyanide and hydrogen cyanide are compiled below:

Cyanide Anion (57-12-5)							
MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
26.02[a]	NA	NA	NA	NA	NA	NA	Note 1[b]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Several simple complexes or salts (e.g., hydrogen cyanide, sodium cyanide, potassium cyanide) are highly soluble in water, while other salts and organic complexes are sparingly soluble or practically insoluble in water.
[a]Howard, P.H. and M. Neal, 1992, ***Dictionary of Chemical Names and Synonyms***, Lewis Publishers, Ann Arbor.
[b]Agency for Toxic Substances and Disease Registry (ATSDR), 1997, ***Update Toxicological Profile for Cyanide***,

Cyanide Anion (57-12-5)							
MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
U.S. Department of Health and Human Services, Atlanta, GA, on line, September.							

Hydrogen Cyanide (74-90-8)										
MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
27.03[a]	-0.25[a]	1.33E-4[a] (25°C)[b]	-0.044[c]	2.11E-1[c] (25°C)[b]	2.44E-5[c] (25°C)[b]	9.76E-1[a] (25°C)	1E+6[a] (25°C)	298.8[a]	456.7[a]	6.02E+3[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);,$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole).
[a]Hazardous Substance Data Bank (HSDB), 2004, National Library of Medicine, on line, accessed 22 April.
[b]Assumed.
[c]Calculated as described in Introduction to Toxicity Profiles.

2.0 Environmental Fate and Transport

Cyanide is a naturally occurring substance (ATSDR, 2008; HSDB, 2010). Hydrogen cyanide may be produced naturally by microorganisms as well as from the degradation of cyanogenic glycosides, which are produced naturally by many plants. Several species of blue-green algae liberate hydrogen cyanide in the process of nitrate metabolism. Laetrile and amygdalin, which occur in substantial concentrations in several fruit pits (e.g., cherries, peaches, apricots, apples, pears) liberate cyanide following ingestion.

Major releases to the environment occur from metal treatment and ore extraction (primarily to water) and in automobile exhaust (primarily to the atmosphere) (ATSDR,2008). The production of hydrogen cyanide and its use as a starting material in the manufacture of acrylates, cyanide salts, herbicides and dyes as well as its former use as a fumigant may result in its release to the environment through various waste streams (HSDB, 2010). It also may be liberated from blast furnaces, gas works, coke ovens and oil shale retorting operations. Most hydrogen cyanide is emitted primarily to the atmosphere or waste water. Various cyanide salts may be released during their use in ore extraction and other metallurgic operations. Materials containing cyanide compounds disposed on land may cause elevated levels of cyanide in underlying strata and in groundwater. Cigarette smoke contains low levels of hydrogen cyanide.

Hydrogen cyanide released to the atmosphere is expected to remain solely in the vapor phase and to react slowly with photochemically generated hydroxyl radicals (HSDB, 2010). A half-life of approximately 300 to 550 days has been estimated for this reaction. Hydrogen cyanide is expected to be resistant to direct photolysis. The relatively slow rate of degradation suggests that hydrogen cyanide has the potential for transport over long distances before being removed by physical or chemical processes. Since hydrogen cyanide is miscible in water, wet deposition may be the most important removal process. Metal cyanide particles released to the air in dust are expected to be removed by both wet and dry deposition.

Cyanide may occur in the form of hydrogen cyanide, metal salts, or immobile metallocyanide complexes in soil (ATSDR, 2008; HSDB, 2010). It is expected that volatilization of hydrogen cyanide would be an important mechanism for cyanide removal from dry soil surfaces and from moist soil surfaces with pH less than 9.2. Hydrogen cyanide and many cyanide salts are very water soluble and are expected to be highly mobile in soil, readily leaching to deeper levels and to groundwater. Concentrations sufficiently low so as not to be toxic to microorganisms may undergo biodegradation in subsurface soil. Microbial degradation may yield formamide, or

complete mineralization may yield carbon dioxide and ammonia. Degradation of low concentrations in soil may substantially reduce the potential for leaching to groundwater.

Hydrogen cyanide is not expected to adsorb to suspended solids and sediment in water (HSDB, 2010). Volatilization from water surfaces is expected to be the most important removal mechanism. Biodegradation may be an important removal mechanism for low concentrations that are not toxic to microorganisms as explained for soil.

Hydrogen cyanide is volatile and labile at low concentrations. Its low log K_{ow} suggests that bioconcentration is unlikely to be significant. Some metal complexes have been shown to biotransfer, but the toxicity of these complexes is much less than that of hydrogen cyanide because of their very low solubility (ATSDR, 2008). There is no evidence of biomagnification in the food chain (ATSDR, 2008), and EPA (1995) has determined that cyanide is not a threat to human health through fish consumption. Biotransfer factors are not estimated for cyanide for these reasons.

3.0 Toxicokinetics

Inhalation exposure of humans to hydrogen cyanide results in very rapid absorption and high systemic retention (approximately 58 percent retention) (ATSDR,2008). Absorption is similarly rapid following oral exposure. Excretion data from orally treated animals suggest a minimum absorption factor of approximately 50 percent, but the extent of absorption is probably much higher. Dermal absorption of hydrogen cyanide by humans is inferred from toxicity data and supported by data from experimental animals. It is likely that some cyanide salts may also be absorbed but the extent has not been quantified.

Cyanide is rapidly and widely distributed throughout the body following absorption (ATSDR,2008).

The primary detoxication pathway involves the action of the enzyme rhodanese to combine cyanide with sulfane sulfur to yield thiocyanate, which is rapidly excreted through the urine (ATSDR, 2008). Rhodanese activity is located in most tissues of the body; the relative activity largely dependent on species. Highest levels are not generally found in the liver, which is often the primary site of metabolism for environmental contaminants. Minor detoxication pathways include pulmonary excretion of hydrogen cyanide, conversion of cyanide to carbon dioxide or other constituents that enter the single-carbon pool, and incorporation into cyanocobalamin (vitamin B_{12}). Elimination occurs rapidly, resulting in a half-life for cyanide of approximately 6 hours in humans. The incorporation of carbon into the single-carbon pool may account for the low estimate of extent of GI absorption from excretion data.

Hydrogen cyanide is the toxic moiety, complexing with ferric iron in various metalloenzymes, inhibiting mitochondrial cytochrome c oxidase and resulting in histotoxic anoxia (ATSDR,2008). Several changes follow that exacerbate the original biochemical lesion.

4.0 Dermal Exposure

GI absorption of cyanide almost certainly exceeds 50 percent as noted in Section 3.0. EPA (2004) suggests that oral toxicity values should not be adjusted when used for dermal exposure

unless GI absorption is less than 50 percent. Therefore, the oral toxicity values described below are adopted without modification for use for dermal exposure

EPA (1991) stated that, "performing an oral-to-dermal extrapolation would not be appropriate because of the uncertainty that the oral RfD for cyanide would provide protection for the effects caused by dermal exposure." The available data, however, suggest that the effects following oral and dermal exposure are similar (ATSDR, 2008). Furthermore, nothing in the toxicokinetic data suggest that detoxication would occur more efficiently following oral exposure so that the oral RfD may not be sufficiently protective for dermal exposure. Therefore, it is judged that the oral RfD is an appropriate value with which to evaluate the toxicity of dermal exposure to cyanide.

Two scenarios are relevant to dermal exposure to cyanide. The first scenario is exposure to cyanide in soil. Cyanide present in soil as hydrogen cyanide would be likely to volatilize so that dermal exposure is expected to be insignificant, as noted by EPA (2004) for other VOCs. Therefore, dermal exposure to hydrogen cyanide in soil is not quantified. It is possible that cyanide may exist as various salts or complexes in soil. Although these compounds may be dermally absorbed, the extent has not been quantified, so no ABS is available with which to quantify dermal uptake. Therefore, dermal uptake of cyanide from soil is not quantified, as recommended by EPA (2004).

The second scenario is exposure to cyanide in water, which may occur as hydrogen cyanide or soluble salts. Cyanide in water will be assumed to be present entirely as hydrogen cyanide to simplify the evaluation. Values for t*, K_p, ϑ, B and FA estimated by the EPA (2004) methodology follow:

Chemical	t*	K_p	τ	FA	B
Hydrogen Cyanide	0.36	7.65E-4	0.15	1	0.0
t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); □ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).					

5.0 Noncancer Effects Evaluation

Oral LD_{50} values in laboratory animals range from 8 to 22 mg/kg, depending on the particular cyanide compound and laboratory species (ATSDR, 2008; HSDB, 2010), indicating that the acute oral toxicity of cyanide is high. Prolonged oral exposure is associated with weight loss, thyroid effects and nervous system effects, particularly myelin degeneration (EPA, 2010). A verified chronic oral RfD of 2E-2 mg/kg-day for free cyanide and hydrogen cyanide was derived from a NOAEL of 10.8 mg/kg-day in a 2-year study in which rats were fed diets fumigated with hydrogen cyanide. The LOAEL of 30 mg/kg-day in another rat feeding study is associated with the effects described above. An uncertainty factor of 500 was applied. Confidence in the oral RfD is medium. Loss of body weight, thyroid effects and nervous system effects are considered the critical effects for prolonged oral exposure to cyanide. EPA (1997) adopted the verified chronic oral RfD as sufficiently protective for subchronic oral exposure.

EPA (2010) verified a chronic inhalation RfC of 3E-3 mg/m^3 for hydrogen cyanide based on nervous symptoms and thyroid effects in occupationally exposed humans. The key study involved 36 non-smoking male workers employed in the electroplating sections of three factories

in Egypt exposed for 5 to 10 years (1 man exposed for 15 years). Twenty non-smoking unexposed male volunteers served as controls. Breathing-zone cyanide concentrations ranged from 4.63 to 13.69 mg/m^3, with a mean of 7.07 to 11.45 mg/m^3. Symptoms reported more frequently in the exposed workers included (in decreasing order of frequency) headache, weakness, and changes in the senses of taste and smell. Lacrimation, abdominal colic, and precordial (lower stomach) pain, salivation, and nervous instability occurred less frequently. Twenty of the exposed workers had thyroid enlargement to a mild or moderate degree, and thyroid function (iodine uptake) was altered. The lowest mean concentration recorded in the three factories, 7.07 mg/m^3, corresponding to an exposure-adjusted concentration of 2.5 mg/m^3, was designated a LOAEL. Application of an uncertainty factor of 1000 (factors of 10 each to estimate a NOAEL from a LOAEL and to provide additional protection for unusually sensitive individuals, and factors of 3 each for deficiencies in the database [lack of chronic and multigenerational reproduction studies] and for less than chronic duration) yields the verified chronic inhalation RfC of 3E-3 mg/m^3. The chronic RfC is equivalent to a chronic inhalation RfD of 8.6E-4 mg/kg-day. The thyroid and CNS are the targets for prolonged inhalation exposure. Confidence in the verified RfC is low.

A subchronic inhalation RfC of 8E-3 mg/m^3 equivalent to a subchronic inhalation RfD of 2.3E-3 mg/kg-day is derived by applying an uncertainty factor of 300 to the LOAEL of 2.5 mg/m^3 described above. The uncertainty factor of 300 reflects the chronic uncertainty factor of 1000 excluding the factor of 3 to expand from subchronic to chronic exposure.

The chronic and subchronic inhalation RfC and RfD values can be applied to any airborne form of cyanide.

6.0 Carcinogenicity Evaluation

EPA (2010) classified cyanide in EPA cancer weight-of-evidence Group D – not classifiable as to carcinogenicity to humans – because of a lack of data in humans or laboratory animals. Cancer potency factors are not derived for Group D chemicals.

7.0 Toxicity Summary

Toxicity values for cyanide/hydrogen cyanide are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
2E-2	2E-2	BW, T, NS	8E-3/ 2.3E-3	3E-3/ 8.6E-4	T, CNS	D	NA	D	NA	NA

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); NA = not applicable.
Target organ or critical effect abbreviations: BW = reduced body weight; T = thyroid, NS = nervous system; CNS = central nervous system.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

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APPENDIX D

RISK CHARACTERIZATION SPREADSHEETS

Table D-1

Groundskeeper, Current Scenarios, Exposure to Surface Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Aluminum	1.13E+04	3.94E-03	1.10E-02	NA	1.10E-02	NA	NA	NA	NA	NA
Beryllium	1.14E+01	3.98E-06	1.12E-05	NA	5.58E-03	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	7.33E-01	2.56E-07	7.17E-07	1.87E-07	NA	1.91E-08	2.20E-07	6.15E-07	1.60E-07	NA
Benzo(a)pyrene	7.03E-01	2.46E-07	6.88E-07	1.79E-06	NA	1.83E-08	2.11E-07	5.90E-07	1.54E-06	NA
Benzo(b)fluoranthene	8.29E-01	2.90E-07	8.11E-07	2.11E-07	NA	2.16E-08	2.49E-07	6.96E-07	1.81E-07	NA
Indeno(1,2,3-cd)pyrene	1.03E+00	3.61E-07	1.01E-06	2.64E-07	NA	2.69E-08	3.10E-07	8.68E-07	2.26E-07	NA
Total ILCR or HI				**2.46E-06**	**1.66E-02**				**2.11E-06**	**NA**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-1

Groundskeeper, Current Scenarios, Exposure to Surface Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Aluminum	1.13E-03	7.89E-05	2.21E-04	NA	1.58E-01	**NA**	**1.69E-01**
Beryllium	1.14E-06	7.97E-08	2.23E-07	6.69E-07	3.91E-02	**6.69E-07**	**4.47E-02**
Semivolatile Organic Compounds							
Benzo(a)anthracene	7.33E-08	5.12E-09	1.43E-08	1.59E-09	NA	**3.49E-07**	**NA**
Benzo(a)pyrene	7.03E-08	4.91E-09	1.38E-08	1.52E-08	NA	**3.35E-06**	**NA**
Benzo(b)fluoranthene	8.29E-08	5.79E-09	1.62E-08	1.80E-09	NA	**3.95E-07**	**NA**
Indeno(1,2,3-cd)pyrene	1.03E-07	7.23E-09	2.02E-08	2.24E-09	NA	**4.92E-07**	**NA**
Total ILCR or HI				**6.90E-07**	**1.97E-01**	**5.25E-06**	**2.13E-01**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Aluminum	1.00E+04	3.49E-03	9.79E-03	NA	9.79E-03	NA	NA	NA	NA	NA
Beryllium	8.52E+00	2.98E-06	8.34E-06	NA	4.17E-03	NA	NA	NA	NA	NA
Cadmium	1.26E+00	4.41E-07	1.23E-06	NA	1.23E-03	NA	NA	NA	NA	NA
Manganese	1.37E+03	4.80E-04	1.34E-03	NA	2.86E-02	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	2.57E-01	8.98E-08	2.51E-07	6.56E-08	NA	6.68E-09	7.71E-08	2.16E-07	5.63E-08	NA
Benzo(a)pyrene	2.16E-01	7.55E-08	2.11E-07	5.51E-07	NA	5.62E-09	6.48E-08	1.81E-07	4.73E-07	NA
Benzo(b)fluoranthene	3.47E-01	1.21E-07	3.40E-07	8.85E-08	NA	9.02E-09	1.04E-07	2.91E-07	7.60E-08	NA
Indeno(1,2,3-cd)pyrene	4.46E-01	1.56E-07	4.36E-07	1.14E-07	NA	1.16E-08	1.34E-07	3.74E-07	9.76E-08	NA
Total ILCR or HI				**8.19E-07**	**4.38E-02**				**7.03E-07**	**NA**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Aluminum	1.00E-03	6.99E-05	1.96E-04	NA	1.40E-01	**NA**	**1.50E-01**
Beryllium	8.52E-07	5.96E-08	1.67E-07	5.00E-07	2.93E-02	**5.00E-07**	**3.34E-02**
Cadmium	1.26E-07	8.81E-09	2.47E-08	5.55E-08	8.51E-03	**5.55E-08**	**9.74E-03**
Manganese	1.37E-04	9.60E-06	2.69E-05	NA	1.92E+00	**NA**	**1.95E+00**
Semivolatile Organic Compounds							
Benzo(a)anthracene	2.57E-08	1.80E-09	5.03E-09	5.57E-10	NA	**1.22E-07**	**NA**
Benzo(a)pyrene	2.16E-08	1.51E-09	4.23E-09	4.68E-09	NA	**1.03E-06**	**NA**
Benzo(b)fluoranthene	3.47E-08	2.43E-09	6.79E-09	7.52E-10	NA	**1.65E-07**	**NA**
Indeno(1,2,3-cd)pyrene	4.46E-08	3.12E-09	8.73E-09	9.66E-10	NA	**2.12E-07**	**NA**
Total ILCR or HI				**5.63E-07**	**2.10E+00**	**2.08E-06**	**2.14E+00**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-3

Groundskeeper, Future Scenario, Exposure to Bedrock Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
	EPC	Dose	Dose			Absorbed	Dose	Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/L	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Inorganics												
Antimony	5.80E-03	2.03E-05	5.68E-05	NA	1.42E-01	5.80E-09	6.69E-08	1.87E-07	NA	3.12E-03	**NA**	**1.45E-01**
Arsenic	1.10E-01	3.84E-04	1.08E-03	5.77E-04	3.59E+00	1.10E-07	1.27E-06	3.55E-06	1.90E-06	1.18E-02	**5.79E-04**	**3.60E+00**
Iron	4.91E+00	1.72E-02	4.80E-02	NA	6.86E-02	4.91E-06	5.66E-05	1.59E-04	NA	NA	**NA**	**6.86E-02**
Manganese	8.57E-01	2.99E-03	8.39E-03	NA	1.78E-01	8.57E-07	9.88E-06	2.77E-05	NA	1.46E-02	**NA**	**1.93E-01**
Thallium	5.30E-03	1.85E-05	5.19E-05	NA	7.98E-01	5.30E-09	6.11E-08	1.71E-07	NA	2.63E-03	**NA**	**8.00E-01**
Semivolatile Organic Compounds												
Methylnaphthalene, 2-	3.62E-02	1.27E-04	3.54E-04	NA	8.86E-02	7.25E-06	8.36E-05	2.34E-04	NA	5.85E-02	**NA**	**1.47E-01**
Naphthalene	3.32E-02	1.16E-04	3.25E-04	NA	1.62E-02	3.23E-06	3.72E-05	1.04E-04	NA	5.21E-03	**NA**	**2.15E-02**
Volatile Organic Compounds												
Benzene	1.30E+00	4.54E-03	1.27E-02	2.50E-04	3.18E+00	2.90E-05	3.35E-04	9.37E-04	1.84E-05	2.34E-01	**2.68E-04**	**3.41E+00**
Chloroform	1.80E-02	6.29E-05	1.76E-04	NA	1.76E-02	2.39E-07	2.76E-06	7.72E-06	NA	7.72E-04	**NA**	**1.84E-02**
Chloromethane (Methyl Chloride	2.16E-01	7.55E-04	2.11E-03	NA	NA	8.81E-07	1.02E-05	2.84E-05	NA	NA	**NA**	**NA**
Ethylbenzene	1.76E-01	6.15E-04	1.72E-03	NA	1.72E-02	1.54E-05	1.78E-04	4.99E-04	NA	4.99E-03	**NA**	**2.22E-02**
Methylene chloride	2.88E-02	1.01E-04	2.82E-04	7.55E-07	4.70E-03	1.58E-07	1.82E-06	5.09E-06	1.36E-08	8.48E-05	**7.68E-07**	**4.78E-03**
Tetrachloroethane, 1,1,2,2-	5.30E-04	1.85E-06	5.19E-06	3.70E-07	1.04E-04	9.75E-09	1.12E-07	3.15E-07	2.25E-08	6.29E-06	**3.93E-07**	**1.10E-04**
Toluene	7.30E-01	2.55E-03	7.14E-03	NA	8.93E-02	3.70E-05	4.27E-04	1.19E-03	NA	1.49E-02	**NA**	**1.04E-01**
Xylenes	1.34E+00	4.68E-03	1.31E-02	NA	6.56E-02	1.27E-04	1.47E-03	4.11E-03	NA	2.05E-02	**NA**	**8.61E-02**
General Chemistry												
Cyanide, Total	1.20E-01	4.19E-04	1.17E-03	NA	5.87E-02	1.20E-07	1.38E-06	3.87E-06	NA	1.94E-04	**NA**	**5.89E-02**
Total ILCR or HI				**8.28E-04**	**8.31E+00**				**2.03E-05**	**3.72E-01**	**8.48E-04**	**8.68E+00**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter

Table D-4

Groundskeeper, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
	EPC	Dose	Dose			Absorbed	Dose	Dose			Total	Total
Chemicals of Potential Concern	mg/L	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ	ILCR	HI
Inorganics												
Cobalt	1.85E-02	6.48E-05	1.81E-04	NA	6.04E-01	7.41E-09	8.55E-08	2.39E-07	NA	7.98E-04	**NA**	**6.05E-01**
Iron	3.86E+00	1.35E-02	3.77E-02	NA	5.39E-02	3.86E-06	4.45E-05	1.24E-04	NA	NA	**NA**	**5.39E-02**
Manganese	3.23E+01	1.13E-01	3.16E-01	NA	6.72E+00	3.23E-05	3.72E-04	1.04E-03	NA	5.49E-01	**NA**	**7.27E+00**
Thallium	3.14E-02	1.10E-04	3.08E-04	NA	4.73E+00	3.14E-08	3.63E-07	1.02E-06	NA	1.56E-02	**NA**	**4.75E+00**
Volatile Organic Compounds												
Chloroform	4.80E-04	1.68E-06	4.70E-06	NA	4.70E-04	6.38E-09	7.36E-08	2.06E-07	NA	2.06E-05	**NA**	**4.90E-04**
General Chemistry												
Sulfate	5.20E+02	1.82E+00	5.09E+00	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR or HI				**NA**	**1.21E+01**				**NA**	**5.65E-01**	**NA**	**1.27E+01**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter

Table D-5

Indoor Worker, Future Scenario, Exposure to Surface Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion					
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics							
Aluminum	1.13E+04	1.97E-03	5.52E-03	NA	5.52E-03	**NA**	**5.52E-03**
Beryllium	1.14E+01	1.99E-06	5.58E-06	NA	2.79E-03	**NA**	**2.79E-03**
Semivolatile Organic Compounds							
Benzo(a)anthracene	7.33E-01	1.28E-07	3.59E-07	9.35E-08	NA	**9.35E-08**	**NA**
Benzo(a)pyrene	7.03E-01	1.23E-07	3.44E-07	8.97E-07	NA	**8.97E-07**	**NA**
Benzo(b)fluoranthene	8.29E-01	1.45E-07	4.06E-07	1.06E-07	NA	**1.06E-07**	**NA**
Indeno(1,2,3-cd)pyrene	1.03E+00	1.81E-07	5.06E-07	1.32E-07	NA	**1.32E-07**	**NA**
Total ILCR or HI						**1.23E-06**	**8.31E-03**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram

Table D-6

Indoor Worker, Future Scenario, Exposure to Bedrock Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
	EPC	Dose	Dose			Absorbed	Dose	Dose			Total	Total
Chemicals of Potential Concern	mg/L	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ	ILCR	HI
Inorganics												
Antimony	5.80E-03	2.03E-05	5.68E-05	NA	1.42E-01	5.80E-09	6.69E-08	1.87E-07	NA	3.12E-03	**NA**	**1.45E-01**
Arsenic	1.10E-01	3.84E-04	1.08E-03	5.77E-04	3.59E+00	1.10E-07	1.27E-06	3.55E-06	1.90E-06	1.18E-02	**5.79E-04**	**3.60E+00**
Iron	4.91E+00	1.72E-02	4.80E-02	NA	6.86E-02	4.91E-06	5.66E-05	1.59E-04	NA	NA	**NA**	**6.86E-02**
Manganese	8.57E-01	2.99E-03	8.39E-03	NA	1.78E-01	8.57E-07	9.88E-06	2.77E-05	NA	1.46E-02	**NA**	**1.93E-01**
Thallium	5.30E-03	1.85E-05	5.19E-05	NA	7.98E-01	5.30E-09	6.11E-08	1.71E-07	NA	2.63E-03	**NA**	**8.00E-01**
Semivolatile Organic Compounds												
Methylnaphthalene, 2-	3.62E-02	1.27E-04	3.54E-04	NA	8.86E-02	7.25E-06	8.36E-05	2.34E-04	NA	5.85E-02	**NA**	**1.47E-01**
Naphthalene	3.32E-02	1.16E-04	3.25E-04	NA	1.62E-02	3.23E-06	3.72E-05	1.04E-04	NA	5.21E-03	**NA**	**2.15E-02**
Volatile Organic Compounds												
Benzene	1.30E+00	4.54E-03	1.27E-02	2.50E-04	3.18E+00	2.90E-05	3.35E-04	9.37E-04	1.84E-05	2.34E-01	**2.68E-04**	**3.41E+00**
Chloroform	1.80E-02	6.29E-05	1.76E-04	NA	1.76E-02	2.39E-07	2.76E-06	7.72E-06	NA	7.72E-04	**NA**	**1.84E-02**
Chloromethane (Methyl Chloride)	2.16E-01	7.55E-04	2.11E-03	NA	NA	8.81E-07	1.02E-05	2.84E-05	NA	NA	**NA**	**NA**
Ethylbenzene	1.76E-01	6.15E-04	1.72E-03	NA	1.72E-02	1.54E-05	1.78E-04	4.99E-04	NA	4.99E-03	**NA**	**2.22E-02**
Methylene chloride	2.88E-02	1.01E-04	2.82E-04	7.55E-07	4.70E-03	1.58E-07	1.82E-06	5.09E-06	1.36E-08	8.48E-05	**7.68E-07**	**4.78E-03**
Tetrachloroethane, 1,1,2,2-	5.30E-04	1.85E-06	5.19E-06	3.70E-07	1.04E-04	9.75E-09	1.12E-07	3.15E-07	2.25E-08	6.29E-06	**3.93E-07**	**1.10E-04**
Toluene	7.30E-01	2.55E-03	7.14E-03	NA	8.93E-02	3.70E-05	4.27E-04	1.19E-03	NA	1.49E-02	**NA**	**1.04E-01**
Xylenes	1.34E+00	4.68E-03	1.31E-02	NA	6.56E-02	1.27E-04	1.47E-03	4.11E-03	NA	2.05E-02	**NA**	**8.61E-02**
General Chemistry												
Cyanide, Total	1.20E-01	4.19E-04	1.17E-03	NA	5.87E-02	1.20E-07	1.38E-06	3.87E-06	NA	1.94E-04	**NA**	**5.89E-02**
Total ILCR or HI				**8.28E-04**	**8.31E+00**				**2.03E-05**	**3.72E-01**	**8.48E-04**	**8.68E+00**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter

Table D-7

Indoor Worker, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
Chemicals of Potential Concern	EPC mg/L	Dose mg/kg-day	Dose mg/kg-day	ILCR	HQ	Absorbed mg/cm^2-day	Dose mg/kg-day	Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics												
Cobalt	1.85E-02	6.48E-05	1.81E-04	NA	6.04E-01	7.41E-09	8.55E-08	2.39E-07	NA	7.98E-04	**NA**	**6.05E-01**
Iron	3.86E+00	1.35E-02	3.77E-02	NA	5.39E-02	3.86E-06	4.45E-05	1.24E-04	NA	NA	**NA**	**5.39E-02**
Manganese	3.23E+01	1.13E-01	3.16E-01	NA	6.72E+00	3.23E-05	3.72E-04	1.04E-03	NA	5.49E-01	**NA**	**7.27E+00**
Thallium	3.14E-02	1.10E-04	3.08E-04	NA	4.73E+00	3.14E-08	3.63E-07	1.02E-06	NA	1.56E-02	**NA**	**4.75E+00**
Volatile Organic Compounds												
Chloroform	4.80E-04	1.68E-06	4.70E-06	NA	4.70E-04	6.38E-09	7.36E-08	2.06E-07	NA	2.06E-05	**NA**	**4.90E-04**
General Chemistry												
Sulfate	5.20E+02	1.82E+00	5.09E+00	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR or HI				**NA**	**1.21E+01**				**NA**	**5.65E-01**	**NA**	**1.27E+01**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter

Table D-8

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Aluminum	1.00E+04	2.31E-04	3.22E-02	NA	3.22E-02	NA	NA	NA	NA	NA
Beryllium	8.52E+00	1.97E-07	2.74E-05	NA	1.37E-02	NA	NA	NA	NA	NA
Cadmium	1.26E+00	2.91E-08	4.06E-06	NA	4.06E-03	NA	NA	NA	NA	NA
Manganese	1.37E+03	3.17E-05	4.42E-03	NA	9.41E-02	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	2.57E-01	5.93E-09	8.28E-07	4.33E-09	NA	1.00E-08	2.31E-09	3.23E-07	1.69E-09	NA
Benzo(a)pyrene	2.16E-01	4.98E-09	6.96E-07	3.64E-08	NA	8.42E-09	1.94E-09	2.71E-07	1.42E-08	NA
Benzo(b)fluoranthene	3.47E-01	8.00E-09	1.12E-06	5.84E-09	NA	1.35E-08	3.12E-09	4.36E-07	2.28E-09	NA
Indeno(1,2,3-cd)pyrene	4.46E-01	1.03E-08	1.44E-06	7.51E-09	NA	1.74E-08	4.01E-09	5.60E-07	2.93E-09	NA
Total ILCR or HI				**5.40E-08**	**1.44E-01**				**2.11E-08**	**NA**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-8

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Aluminum	3.50E-03	4.89E-06	6.83E-04	NA	4.88E-01	**NA**	**5.20E-01**
Beryllium	2.98E-06	4.17E-09	5.82E-07	3.50E-08	1.02E-01	**3.50E-08**	**1.16E-01**
Cadmium	4.41E-07	6.17E-10	8.61E-08	3.89E-09	2.97E-02	**3.89E-09**	**3.38E-02**
Manganese	4.81E-04	6.72E-07	9.38E-05	NA	6.70E+00	**NA**	**6.79E+00**
Semivolatile Organic Compounds							
Benzo(a)anthracene	9.00E-08	1.26E-10	1.76E-08	3.90E-11	NA	**6.05E-09**	**NA**
Benzo(a)pyrene	7.56E-08	1.06E-10	1.48E-08	3.28E-10	NA	**5.09E-08**	**NA**
Benzo(b)fluoranthene	1.21E-07	1.70E-10	2.37E-08	5.26E-11	NA	**8.17E-09**	**NA**
Indeno(1,2,3-cd)pyrene	1.56E-07	2.18E-10	3.05E-08	6.76E-11	NA	**1.05E-08**	**NA**
Total ILCR or HI				**3.94E-08**	**7.32E+00**	**1.15E-07**	**7.46E+00**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-9

Construction Worker, Current and Future Scenarios, Exposure to Sediment
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
	EPC	Dose	Dose			Absorbed	Dose	Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Inorganics												
Arsenic	1.59E+01	3.67E-07	5.12E-05	5.50E-07	1.71E-01	1.43E-07	3.30E-08	4.61E-06	4.95E-08	1.54E-02	**6.00E-07**	**1.86E-01**
Chromium, total	1.69E+01	3.90E-07	5.44E-05	NA	2.59E-03	NA	NA	NA	NA	NA	**NA**	**2.59E-03**
Semivolatiles Organic Compounds												
Benzo(a)pyrene	1.12E-01	2.58E-09	3.61E-07	1.89E-08	NA	4.37E-09	1.01E-09	1.41E-07	7.35E-09	NA	**2.62E-08**	**NA**
Benzo(b)fluoranthene	1.75E-01	4.04E-09	5.64E-07	2.95E-09	NA	6.83E-09	1.57E-09	2.20E-07	1.15E-09	NA	**4.10E-09**	**NA**
Total ILCR or HI				**5.72E-07**	**1.73E-01**				**5.80E-08**	**1.54E-02**	**6.30E-07**	**1.89E-01**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/cm^2 - milligram per centimeter squared

Table D-10

Construction Worker, Current and Future Scenarios, Exposure to Surface Water
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Dermal Contact				
		Dose	Cancer	Noncancer		
Chemicals of Potential Concern	EPC mg/L	Absorbed mg/cm^2-day	Dose mg/kg-day	Dose mg/kg-day	**Total ILCR**	**Total HI**
Inorganics						
Arsenic	8.30E-03	3.32E-08	7.66E-09	1.07E-06	1.15E-08	3.56E-03
Chromium	1.39E-02	5.56E-08	1.28E-08	1.79E-06	NA	6.63E-03
Lead	1.50E-02	NA	NA	NA	NA	NA
Total ILCR or HI					**1.15E-08**	**1.02E-02**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram

Table D-11

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact				
	EPC	Adult Dose	Child Dose	Resident	Adult Dose Absorbed	Adult Dose	Child Dose Absorbed	Child Dose	Resident
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	mg/cm^2-day	mg/kg-day	mg/cm^2-day	mg/kg-day	ILCR
Inorganics									
Aluminum	1.00E+04	4.23E-03	9.86E-03	NA	NA	NA	NA	NA	NA
Beryllium	8.52E+00	3.60E-06	8.41E-06	NA	NA	NA	NA	NA	NA
Cadmium	1.26E+00	5.33E-07	1.24E-06	NA	NA	NA	NA	NA	NA
Manganese	1.37E+03	5.80E-04	1.35E-03	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds									
Benzo(a)anthracene	2.57E-01	1.09E-07	2.53E-07	2.64E-07	2.34E-09	6.26E-08	6.68E-09	1.03E-07	1.21E-07
Benzo(a)pyrene	2.16E-01	9.13E-08	2.13E-07	2.22E-06	1.97E-09	5.26E-08	5.62E-09	8.62E-08	1.01E-06
Benzo(b)fluoranthene	3.47E-01	1.47E-07	3.42E-07	3.57E-07	3.16E-09	8.45E-08	9.02E-09	1.38E-07	1.63E-07
Indeno(1,2,3-cd)pyrene	4.46E-01	1.89E-07	4.40E-07	4.59E-07	4.06E-09	1.09E-07	1.16E-08	1.78E-07	2.09E-07
Total ILCR				**3.30E-06**					**1.51E-06**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/kg - milligram per kilogram
mg/cm^2 - milligram per square meter
mg/m^3 - milligram per cubic meter

Table D-11

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Adult Dose mg/kg-day	Inhalation Child Dose mg/kg-day	Inhalation Resident ILCR	**All Pathways Total ILCR**
Inorganics					
Aluminum	1.97E-05	1.85E-06	1.08E-06	NA	**NA**
Beryllium	1.68E-08	1.58E-09	9.20E-10	2.10E-08	**2.10E-08**
Cadmium	2.48E-09	2.33E-10	1.36E-10	2.33E-09	**2.33E-09**
Manganese	2.70E-06	2.54E-07	1.48E-07	NA	**NA**
Semivolatile Organic Compounds					
Benzo(a)anthracene	5.06E-10	4.76E-11	2.77E-11	2.33E-11	**3.85E-07**
Benzo(a)pyrene	4.25E-10	4.00E-11	2.33E-11	1.96E-10	**3.24E-06**
Benzo(b)fluoranthene	6.83E-10	6.42E-11	3.75E-11	3.15E-11	**5.20E-07**
Indeno(1,2,3-cd)pyrene	8.78E-10	8.25E-11	4.81E-11	4.05E-11	**6.68E-07**
Total ILCR				**2.36E-08**	**4.83E-06**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/kg - milligram per kilogram
mg/cm^2 - milligram per square meter
mg/m^3 - milligram per cubic meter

Table D-12

On-Site Child Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC	Child Dose	Child Resident	Dose Absorbed	Child Dose	Child Resident	in Air C_a	Child Dose	Child Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Aluminum	1.00E+04	1.15E-01	1.15E-01	NA	NA	NA	1.97E-05	1.26E-05	8.99E-03	**1.24E-01**
Beryllium	8.52E+00	9.81E-05	4.90E-02	NA	NA	NA	1.68E-08	1.07E-08	1.88E-03	**5.09E-02**
Cadmium	1.26E+00	1.45E-05	1.45E-02	NA	NA	NA	2.48E-09	1.59E-09	5.48E-04	**1.51E-02**
Manganese	1.37E+03	1.58E-02	3.36E-01	NA	NA	NA	2.70E-06	1.73E-06	1.23E-01	**4.60E-01**
Semivolatile Organic Compounds										
Benzo(a)anthracene	2.57E-01	2.96E-06	NA	6.68E-09	1.20E-06	NA	5.06E-10	3.24E-10	NA	**NA**
Benzo(a)pyrene	2.16E-01	2.49E-06	NA	5.62E-09	1.01E-06	NA	4.25E-10	2.72E-10	NA	**NA**
Benzo(b)fluoranthene	3.47E-01	3.99E-06	NA	9.02E-09	1.61E-06	NA	6.83E-10	4.37E-10	NA	**NA**
Indeno(1,2,3-cd)pyrene	4.46E-01	5.13E-06	NA	1.16E-08	2.08E-06	NA	8.78E-10	5.62E-10	NA	**NA**
Total HI			**5.15E-01**			**NA**			**1.35E-01**	**6.50E-01**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/cm^2 - milligram per square meter
mg/m^3 - milligram per cubic meter

Table D-13

On-Site Adult Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC	Adult Dose	Adult Resident	Dose Absorbed	Adult Dose	Adult Resident	in Air C_a	Adult Dose	Adult Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Aluminum	1.00E+04	1.23E-02	1.23E-02	NA	NA	NA	1.97E-05	5.40E-06	3.85E-03	**1.62E-02**
Beryllium	8.52E+00	1.05E-05	5.25E-03	NA	NA	NA	1.68E-08	4.60E-09	8.07E-04	**6.06E-03**
Cadmium	1.26E+00	1.55E-06	1.55E-03	NA	NA	NA	2.48E-09	6.80E-10	2.35E-04	**1.79E-03**
Manganese	1.37E+03	1.69E-03	3.60E-02	NA	NA	NA	2.70E-06	7.41E-07	5.29E-02	**8.89E-02**
Semivolatile Organic Compounds										
Benzo(a)anthracene	2.57E-01	3.17E-07	NA	2.34E-09	1.83E-07	NA	5.06E-10	1.39E-10	NA	**NA**
Benzo(a)pyrene	2.16E-01	2.66E-07	NA	1.97E-09	1.53E-07	NA	4.25E-10	1.17E-10	NA	**NA**
Benzo(b)fluoranthene	3.47E-01	4.28E-07	NA	3.16E-09	2.47E-07	NA	6.83E-10	1.87E-10	NA	**NA**
Indeno(1,2,3-cd)pyrene	4.46E-01	5.50E-07	NA	4.06E-09	3.17E-07	NA	8.78E-10	2.41E-10	NA	**NA**
Total HI			**5.52E-02**			**NA**			**5.78E-02**	**1.13E-01**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/cm^2 - milligram per square meter
mg/m^3 - milligram per cubic meter

Table D-14

On-Site Resident Cancer Risk, Future Scenario, Exposure to Sediment
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact					All
		Adult	Child		Dose	Adult	Dose	Child		Pathways
Chemicals of Potential Concern	EPC mg/kg	Dose mg/kg-day	Dose mg/kg-day	Resident ILCR	Absorbed mg/cm^2-day	Dose mg/kg-day	Absorbed mg/cm^2-day	Dose mg/kg-day	Resident ILCR	**Total ILCR**
Inorganics										
Arsenic	1.59E+01	7.47E-07	1.74E-06	3.73E-06	3.34E-09	1.33E-08	9.54E-09	2.17E-08	5.25E-08	**3.79E-06**
Chromium, total	1.69E+01	7.94E-07	1.85E-06	NA	NA	NA	NA	NA	NA	**NA**
Semivolatiles Organic Compounds										
Benzo(a)pyrene	1.12E-01	5.26E-09	1.23E-08	1.28E-07	1.02E-10	4.05E-10	2.91E-10	6.64E-10	7.80E-09	**1.36E-07**
Benzo(b)fluoranthene	1.75E-01	8.22E-09	1.92E-08	2.00E-08	1.59E-10	6.33E-10	4.55E-10	1.04E-09	1.22E-09	**2.12E-08**
Total ILCR				**3.88E-06**					**6.16E-08**	**3.94E-06**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/kg - milligram per kilogram
mg/cm^2 - milligram per centimeter squared

Table D-15

On-Site Child Resident Noncancer Risk, Future Scenario, Exposure to Sediment
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			All
		Child		Dose	Child		**Pathways**
Chemicals of Potential Concern	EPC mg/kg	Dose mg/kg-day	Child HQ	Absorbed mg/cm²-day	Dose mg/kg-day	Child HQ	**Total HI**
Inorganics							
Arsenic	1.59E+01	2.03E-05	6.78E-02	9.54E-09	2.54E-07	8.46E-04	**6.86E-02**
Chromium, total	1.69E+01	2.16E-05	1.03E-03	NA	NA	NA	**1.03E-03**
Semivolatiles Organic Compounds							
Benzo(a)pyrene	1.12E-01	1.43E-07	NA	2.91E-10	7.74E-09	NA	**NA**
Benzo(b)fluoranthene	1.75E-01	2.24E-07	NA	4.55E-10	1.21E-08	NA	**NA**
Total HI			**6.88E-02**			**8.46E-04**	**6.96E-02**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/cm² - milligram per centimeter squared

Table D-16

On-Site Adult Resident Noncancer Risk, Future Scenario, Exposure to Sediment
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			**All**
		Adult		Dose	Adult		**Pathways**
Chemicals of Potential Concern	EPC mg/kg	Dose mg/kg-day	Adult HQ	Absorbed mg/cm^2-day	Dose mg/kg-day	Adult HQ	**Total HI**
Inorganics							
Arsenic	1.59E+01	2.18E-06	7.26E-03	3.34E-09	3.87E-08	1.29E-04	**7.39E-03**
Chromium, total	1.69E+01	2.32E-06	1.10E-04	NA	NA	NA	**1.10E-04**
Semivolatiles Organic Compounds							
Benzo(a)pyrene	1.12E-01	1.53E-08	NA	1.02E-10	1.18E-09	NA	**NA**
Benzo(b)fluoranthene	1.75E-01	2.40E-08	NA	1.59E-10	1.85E-09	NA	**NA**
Total HI			**7.37E-03**			**1.29E-04**	**7.50E-03**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/cm^2 - milligram per centimeter squared

Table D-17

On-Site Resident Cancer Risk, Future Scenario, Exposure to Bedrock Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact					Inhalation of VOCs				**All**
		Adult	Child		Dose	Adult	Dose	Child		Concentration	Adult	Child		**Pathways**
	EPC	Dose	Dose		Absorbed	Dose	Absorbed	Dose		in Air	Dose	Dose		**Total**
Chemicals of Potential Concern	mg/L	mg/kg-day	mg/kg-day	ILCR	mg/cm^2-day	mg/kg-day	mg/cm^2-day	mg/kg-day	ILCR	mg/m^3	mg/kg-day	mg/kg-day	ILCR	**ILCR**
Inorganics														
Antimony	5.80E-03	5.45E-05	3.18E-05	NA	1.16E-09	1.09E-07	1.93E-09	6.98E-08	NA	NA	NA	NA	NA	**NA**
Arsenic	1.10E-01	1.03E-03	6.03E-04	2.45E-03	2.20E-08	2.07E-06	3.66E-08	1.32E-06	5.09E-06	NA	NA	NA	NA	**2.46E-03**
Iron	4.91E+00	4.61E-02	2.69E-02	NA	9.82E-07	9.22E-05	1.64E-06	5.91E-05	NA	NA	NA	NA	NA	**NA**
Manganese	8.57E-01	8.05E-03	4.70E-03	NA	1.71E-07	1.61E-05	2.85E-07	1.03E-05	NA	NA	NA	NA	NA	**NA**
Thallium	5.30E-03	4.98E-05	2.90E-05	NA	1.06E-09	9.96E-08	1.76E-09	6.38E-08	NA	NA	NA	NA	NA	**NA**
Semivolatile Organic Compounds														
Methylnaphthalene, 2-	3.62E-02	3.40E-04	1.98E-04	NA	1.62E-06	1.52E-04	2.09E-06	7.57E-05	NA	1.81E-02	1.70E-03	9.90E-04	NA	**NA**
Naphthalene	3.32E-02	3.12E-04	1.82E-04	NA	7.22E-07	6.78E-05	9.31E-07	3.37E-05	NA	1.66E-02	1.56E-03	9.08E-04	2.96E-04	**2.96E-04**
Volatile Organic Compounds														
Benzene	1.30E+00	1.22E-02	7.12E-03	1.06E-03	6.49E-06	6.10E-04	8.37E-06	3.03E-04	5.02E-05	6.50E-01	6.10E-02	3.56E-02	2.61E-03	**3.72E-03**
Chloroform	1.80E-02	1.69E-04	9.86E-05	NA	5.35E-08	5.02E-06	6.90E-08	2.50E-06	NA	9.00E-03	8.45E-04	4.92E-04	NA	**NA**
Chloromethane (Methyl Chloride)	2.16E-01	2.03E-03	1.18E-03	NA	1.97E-07	1.85E-05	2.54E-07	9.19E-06	NA	1.08E-01	1.01E-02	5.91E-03	NA	**NA**
Ethylbenzene	1.76E-01	1.65E-03	9.64E-04	NA	3.45E-06	3.24E-04	4.46E-06	1.61E-04	NA	8.80E-02	8.26E-03	4.81E-03	NA	**NA**
Methylene chloride	2.88E-02	2.71E-04	1.58E-04	3.21E-06	3.52E-08	3.31E-06	4.55E-08	1.64E-06	3.72E-08	1.44E-02	1.35E-03	7.88E-04	3.42E-06	**6.67E-06**
Tetrachloroethane, 1,1,2,2-	5.30E-04	4.98E-06	2.90E-06	1.58E-06	2.18E-09	2.05E-07	2.81E-09	1.02E-07	6.13E-08	2.65E-04	2.49E-05	1.45E-05	NA	**1.64E-06**
Toluene	7.30E-01	6.86E-03	4.00E-03	NA	8.27E-06	7.77E-04	1.07E-05	3.86E-04	NA	3.65E-01	3.43E-02	2.00E-02	NA	**NA**
Xylenes	1.34E+00	1.26E-02	7.34E-03	NA	2.84E-05	2.67E-03	3.67E-05	1.33E-03	NA	6.70E-01	6.29E-02	3.67E-02	NA	**NA**
General Chemistry														
Cyanide, Total	1.20E-01	1.13E-03	6.58E-04	NA	2.40E-08	2.25E-06	4.00E-08	1.45E-06	NA	NA	NA	NA	NA	**NA**
Total ILCR				**3.52E-03**					**5.54E-05**				**2.91E-03**	**6.48E-03**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-18

Child On-Site Resident Noncancer Risk, Future Scenario, Exposure to Bedrock Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			**All**
		Child		Dose	Child		Concentration	Child		**Pathways**
	EPC	Dose		Absorbed	Dose		in Air	Dose		**Total**
Chemicals of Potential Concern	mg/L	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Antimony	5.80E-03	3.71E-04	9.27E-01	1.93E-09	8.15E-07	1.36E-02	NA	NA	NA	**9.41E-01**
Arsenic	1.10E-01	7.03E-03	2.34E+01	3.66E-08	1.55E-05	5.15E-02	NA	NA	NA	**2.35E+01**
Iron	4.91E+00	3.14E-01	4.48E-01	1.64E-06	6.90E-04	NA	NA	NA	NA	**4.48E-01**
Manganese	8.57E-01	5.48E-02	1.17E+00	2.85E-07	1.20E-04	6.34E-02	NA	NA	NA	**1.23E+00**
Thallium	5.30E-03	3.39E-04	5.21E+00	1.76E-09	7.45E-07	1.15E-02	NA	NA	NA	**5.22E+00**
Semivolatile Organic Compounds										
Methylnaphthalene, 2-	3.62E-02	2.31E-03	5.79E-01	2.09E-06	8.83E-04	2.21E-01	1.81E-02	1.16E-02	NA	**7.99E-01**
Naphthalene	3.32E-02	2.12E-03	1.06E-01	9.31E-07	3.93E-04	1.96E-02	1.66E-02	1.06E-02	1.23E+01	**1.24E+01**
Volatile Organic Compounds										
Benzene	1.30E+00	8.31E-02	2.08E+01	8.37E-06	3.53E-03	8.83E-01	6.50E-01	4.15E-01	4.82E+01	**6.99E+01**
Chloroform	1.80E-02	1.15E-03	1.15E-01	6.90E-08	2.91E-05	2.91E-03	9.00E-03	5.74E-03	4.10E-01	**5.28E-01**
Chloromethane (Methyl Chloride)	2.16E-01	1.38E-02	NA	2.54E-07	1.07E-04	NA	1.08E-01	6.89E-02	2.65E+00	**2.65E+00**
Ethylbenzene	1.76E-01	1.13E-02	1.13E-01	4.46E-06	1.88E-03	1.88E-02	8.80E-02	5.62E-02	1.94E-01	**3.25E-01**
Methylene chloride	2.88E-02	1.84E-03	3.07E-02	4.55E-08	1.92E-05	3.20E-04	1.44E-02	9.19E-03	3.06E-02	**6.16E-02**
Tetrachloroethane, 1,1,2,2-	5.30E-04	3.39E-05	6.78E-04	2.81E-09	1.19E-06	2.37E-05	2.65E-04	1.69E-04	NA	**7.01E-04**
Toluene	7.30E-01	4.67E-02	5.83E-01	1.07E-05	4.50E-03	5.63E-02	3.65E-01	2.33E-01	1.66E-01	**8.06E-01**
Xylenes	1.34E+00	8.57E-02	4.28E-01	3.67E-05	1.55E-02	7.74E-02	6.70E-01	4.28E-01	1.47E+01	**1.53E+01**
General Chemistry										
Cyanide, Total	1.20E-01	7.67E-03	3.84E-01	4.00E-08	1.69E-05	8.43E-04	NA	NA	NA	**3.84E-01**
Total HI			**5.43E+01**			**1.42E+00**			**7.88E+01**	**1.34E+02**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-19

Adult On-Site Resident Noncancer Risk, Future Scenario, Exposure to Bedrock Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			**All**
		Noncancer		Dose	Adult		Concentration	Adult		**Pathways**
Chemicals of Potential Concern	EPC mg/L	Dose mg/kg-day	HQ	Absorbed mg/cm^2-day	Dose mg/kg-day	HQ	in Air mg/m^3	Dose mg/kg-day	HQ	**Total HI**
Inorganics										
Antimony	5.80E-03	1.59E-04	3.97E-01	1.16E-09	3.18E-07	5.30E-03	NA	NA	NA	**4.03E-01**
Arsenic	1.10E-01	3.01E-03	1.00E+01	2.20E-08	6.03E-06	2.01E-02	NA	NA	NA	**1.01E+01**
Iron	4.91E+00	1.35E-01	1.92E-01	9.82E-07	2.69E-04	NA	NA	NA	NA	**1.92E-01**
Manganese	8.57E-01	2.35E-02	5.00E-01	1.71E-07	4.70E-05	2.47E-02	NA	NA	NA	**5.24E-01**
Thallium	5.30E-03	1.45E-04	2.23E+00	1.06E-09	2.90E-07	4.47E-03	NA	NA	NA	**2.24E+00**
Semivolatile Organic Compounds										
Methylnaphthalene, 2-	3.62E-02	9.92E-04	2.48E-01	1.62E-06	4.44E-04	1.11E-01	1.81E-02	4.96E-03	NA	**3.59E-01**
Naphthalene	3.32E-02	9.10E-04	4.55E-02	7.22E-07	1.98E-04	9.89E-03	1.66E-02	4.55E-03	5.29E+00	**5.34E+00**
Volatile Organic Compounds										
Benzene	1.30E+00	3.56E-02	8.90E+00	6.49E-06	1.78E-03	4.45E-01	6.50E-01	1.78E-01	2.07E+01	**3.00E+01**
Chloroform	1.80E-02	4.93E-04	4.93E-02	5.35E-08	1.47E-05	1.47E-03	9.00E-03	2.46E-03	1.76E-01	**2.27E-01**
Chloromethane (Methyl Chloride)	2.16E-01	5.92E-03	NA	1.97E-07	5.40E-05	NA	1.08E-01	2.96E-02	1.14E+00	**1.14E+00**
Ethylbenzene	1.76E-01	4.82E-03	4.82E-02	3.45E-06	9.46E-04	9.46E-03	8.80E-02	2.41E-02	8.31E-02	**1.41E-01**
Methylene chloride	2.88E-02	7.89E-04	1.32E-02	3.52E-08	9.66E-06	1.61E-04	1.44E-02	3.94E-03	1.31E-02	**2.65E-02**
Tetrachloroethane, 1,1,2,2-	5.30E-04	1.45E-05	2.90E-04	2.18E-09	5.97E-07	1.19E-05	2.65E-04	7.26E-05	NA	**3.02E-04**
Toluene	7.30E-01	2.00E-02	2.50E-01	8.27E-06	2.27E-03	2.83E-02	3.65E-01	1.00E-01	7.14E-02	**3.50E-01**
Xylenes	1.34E+00	3.67E-02	1.84E-01	2.84E-05	7.79E-03	3.90E-02	6.70E-01	1.83E-01	6.33E+00	**6.55E+00**
General Chemistry										
Cyanide, Total	1.20E-01	3.29E-03	1.64E-01	2.40E-08	6.58E-06	3.29E-04	NA	NA	NA	**1.65E-01**
Total HI			**2.33E+01**			**6.99E-01**			**3.38E+01**	**5.78E+01**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-20

On-Site Resident Cancer Risk, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact					Inhalation of VOCs				**All**
		Adult	Child		Dose	Adult	Dose	Child		Concentration	Adult	Child		**Pathways**
Chemicals of Potential Concern	EPC mg/L	Dose mg/kg-day	Dose mg/kg-day	ILCR	Absorbed mg/cm^2-day	Dose mg/kg-day	Absorbed mg/cm^2-day	Dose mg/kg-day	ILCR	in Air mg/m^3	Dose mg/kg-day	Dose mg/kg-day	ILCR	**Total ILCR**
Inorganics														
Cobalt	1.85E-02	1.74E-04	1.02E-04	NA	1.48E-09	1.39E-07	2.47E-09	8.93E-08	NA	NA	NA	NA	NA	**NA**
Iron	3.86E+00	3.62E-02	2.11E-02	NA	7.71E-07	7.24E-05	1.28E-06	4.64E-05	NA	NA	NA	NA	NA	**NA**
Manganese	3.23E+01	3.03E-01	1.77E-01	NA	6.46E-06	6.07E-04	1.08E-05	3.89E-04	NA	NA	NA	NA	NA	**NA**
Thallium	3.14E-02	2.95E-04	1.72E-04	NA	6.29E-09	5.91E-07	1.05E-08	3.79E-07	NA	NA	NA	NA	NA	**NA**
Volatile Organic Compounds														
Chloroform	4.80E-04	4.51E-06	2.63E-06	NA	1.43E-09	1.34E-07	1.84E-09	6.66E-08	NA	2.40E-04	2.25E-05	1.31E-05	NA	**NA**
General Chemistry														
Sulfate	5.20E+02	4.88E+00	2.85E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**
Total ILCR				**NA**					**NA**				**NA**	**NA**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-21

Child On-Site Resident Noncancer Risk, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			**All**
		Child		Dose	Child		Concentration	Child		**Pathways**
	EPC	Dose		Absorbed	Dose		in Air	Dose		**Total**
Chemicals of Potential Concern	mg/L	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Cobalt	1.85E-02	1.18E-03	3.95E+00	2.47E-09	1.04E-06	3.47E-03	NA	NA	NA	**3.95E+00**
Iron	3.86E+00	2.46E-01	3.52E-01	1.28E-06	5.42E-04	NA	NA	NA	NA	**3.52E-01**
Manganese	3.23E+01	2.06E+00	4.39E+01	1.08E-05	4.54E-03	2.39E+00	NA	NA	NA	**4.63E+01**
Thallium	3.14E-02	2.01E-03	3.09E+01	1.05E-08	4.42E-06	6.80E-02	NA	NA	NA	**3.10E+01**
Volatile Organic Compounds										
Chloroform	4.80E-04	3.07E-05	3.07E-03	1.84E-09	7.77E-07	7.77E-05	2.40E-04	1.53E-04	1.09E-02	**1.41E-02**
General Chemistry										
Sulfate	5.20E+02	3.32E+01	NA	NA	NA	NA	NA	NA	NA	**NA**
Total HI			**7.92E+01**			**2.46E+00**			**1.09E-02**	**8.16E+01**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-22

Adult On-Site Resident Noncancer Risk, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			**All**
		Noncancer		Dose	Adult		Concentration	Adult		**Pathways**
Chemicals of Potential Concern	EPC mg/L	Dose mg/kg-day	HQ	Absorbed mg/cm^2-day	Dose mg/kg-day	HQ	in Air mg/m^3	Dose mg/kg-day	HQ	**Total HI**
Inorganics										
Cobalt	1.85E-02	5.08E-04	1.69E+00	1.48E-09	4.06E-07	1.35E-03	NA	NA	NA	**1.69E+00**
Iron	3.86E+00	1.06E-01	1.51E-01	7.71E-07	2.11E-04	NA	NA	NA	NA	**1.51E-01**
Manganese	3.23E+01	8.85E-01	1.88E+01	6.46E-06	1.77E-03	9.32E-01	NA	NA	NA	**1.98E+01**
Thallium	3.14E-02	8.61E-04	1.33E+01	6.29E-09	1.72E-06	2.65E-02	NA	NA	NA	**1.33E+01**
Volatile Organic Compounds										
Chloroform	4.80E-04	1.32E-05	1.32E-03	1.43E-09	3.91E-07	3.91E-05	2.40E-04	6.57E-05	4.69E-03	**6.05E-03**
General Chemistry										
Sulfate	5.20E+02	1.42E+01	NA	NA	NA	NA	NA	NA	NA	**NA**
Total HI			**3.39E+01**			**9.59E-01**			**4.69E-03**	**3.49E+01**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram
mg/m^3- milligram per cubic meter

Table D-23

On-Site Resident Cancer Risk, Future Scenario, Exposure to Surface Water
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Dermal Contact				
		Adult Dose	Adult	Child Dose	Child	
	EPC	Absorbed	Dose	Absorbed	Dose	**Total**
Chemicals of Potential Concern	mg/L	mg/cm^2-day	mg/kg-day	mg/cm^2-day	mg/kg-day	**ILCR**
Inorganics						
Arsenic	8.30E-03	2.49E-08	1.22E-07	2.49E-08	5.68E-08	2.68E-07
Chromium	1.39E-02	4.17E-08	2.04E-07	4.17E-08	9.51E-08	NA
Lead	1.50E-02	NA	NA	NA	NA	NA
Total ILCR						**2.68E-07**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram

Table D-24

Child On-Site Resident, Noncancer Risk, Future Scenario, Exposure to Surface Water
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Dermal Contact		
		Child Dose	Child	
Chemicals of Potential Concern	EPC mg/L	Absorbed mg/cm^2-day	Dose mg/kg-day	HQ
Inorganics				
Arsenic	8.30E-03	2.49E-08	6.62E-07	2.21E-03
Chromium	1.39E-02	4.17E-08	1.11E-06	4.11E-03
Lead	1.50E-02	NA	NA	NA
Total HI				**6.31E-03**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram

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Table D-25

Adult On-Site Resident, Noncancer Risk, Future Scenario, Exposure to Surface Water
Ash Pit 1 Area
Plum Brook Ordnance Works, Sandusky, Ohio

		Dermal Contact		
		Adult Dose	Adult	
Chemicals of Potential Concern	EPC mg/L	Absorbed mg/cm^2-day	Dose mg/kg-day	HQ
Inorganics				
Arsenic	8.30E-03	2.49E-08	3.55E-07	1.18E-03
Chromium	1.39E-02	4.17E-08	5.94E-07	2.20E-03
Lead	1.50E-02	NA	NA	NA
Total HI				**3.38E-03**

EPC - Exposure Point Concentration
HQ - Hazard Quotient; HI - Hazard Index
mg/L - milligram per liter
mg/cm^2 - milligram per square meter
mg/kg - milligram per kilogram

APPENDIX E

ANALYTICAL DATA USED IN BASELINE HUMAN HEALTH RISK ASSESSMENT

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Acenaphthene	83-32-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00739
Acenaphthene	83-32-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00882
Acenaphthene	83-32-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00873
Acenaphthene	83-32-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00826
Acenaphthene	83-32-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0427
Acenaphthene	83-32-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00807
Acenaphthene	83-32-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0376
Acenaphthene	83-32-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00966
Acenaphthene	83-32-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Acenaphthylene	208-96-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Acenaphthylene	208-96-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Acenaphthylene	208-96-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Acenaphthylene	208-96-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Acenaphthylene	208-96-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Acenaphthylene	208-96-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Acenaphthylene	208-96-8	0.2785	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.02505
Acenaphthylene	208-96-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Acenaphthylene	208-96-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Aluminum	7429-90-5	6190	mg/kg	3.97	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.99
Aluminum	7429-90-5	9360	mg/kg	4.61	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		2.3
Aluminum	7429-90-5	9940	mg/kg	4.18		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.09
Aluminum	7429-90-5	12700	mg/kg	4.09		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.05
Aluminum	7429-90-5	10700	mg/kg	4.12		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.06
Aluminum	7429-90-5	10500	mg/kg	4.54	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		2.27
Aluminum	7429-90-5	7555	mg/kg	3.81		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		1.9
Aluminum	7429-90-5	7650	mg/kg	4.84	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		2.42
Aluminum	7429-90-5	7550	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		28.25
Aluminum	7429-90-5	12700	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Aluminum	7429-90-5	8310	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4
Aluminum	7429-90-5	8820	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Aluminum	7429-90-5	16600	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Anthracene	120-12-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Anthracene	120-12-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Anthracene	120-12-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Anthracene	120-12-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Anthracene	120-12-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Anthracene	120-12-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Anthracene	120-12-7	0.2155	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0451
Anthracene	120-12-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Anthracene	120-12-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Antimony	7440-36-0	0.23	mg/kg	0.46	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Antimony	7440-36-0	0.2975	mg/kg	0.595	UJ	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Antimony	7440-36-0	0.347	mg/kg	0.526	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.263
Antimony	7440-36-0	0.352	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Antimony	7440-36-0	0.416	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Antimony	7440-36-0	0.2885	mg/kg	0.577	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Antimony	7440-36-0	0.838	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.2375
Antimony	7440-36-0	0.305	mg/kg	0.61	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Antimony	7440-36-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	1.4
Antimony	7440-36-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Antimony	7440-36-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Antimony	7440-36-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Antimony	7440-36-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Aroclor 1016	12674-11-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1016	12674-11-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1016	12674-11-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1016	12674-11-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1221	11104-28-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1221	11104-28-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1221	11104-28-2	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1221	11104-28-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1221	11104-28-2	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1232	11141-16-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1232	11141-16-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1232	11141-16-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1232	11141-16-5	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1232	11141-16-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1242	53469-21-9	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1242	53469-21-9	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1242	53469-21-9	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1242	53469-21-9	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1242	53469-21-9	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1248	12672-29-6	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1248	12672-29-6	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1248	12672-29-6	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1248	12672-29-6	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1248	12672-29-6	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1254	11097-69-1	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1254	11097-69-1	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1254	11097-69-1	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1254	11097-69-1	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1254	11097-69-1	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1260	11096-82-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1260	11096-82-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1260	11096-82-5	0.1025	mg/kg	0.21	JU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	JU	0.04205
Aroclor 1260	11096-82-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Arsenic	7440-38-2	6.7	mg/kg	0.919	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.46
Arsenic	7440-38-2	9.14	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.595
Arsenic	7440-38-2	13.2	mg/kg	1.05		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.526
Arsenic	7440-38-2	11.7	mg/kg	1.06		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.531
Arsenic	7440-38-2	9.06	mg/kg	1.1		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.551
Arsenic	7440-38-2	6.4	mg/kg	1.15	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.577
Arsenic	7440-38-2	10.95	mg/kg	0.9515		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.476
Arsenic	7440-38-2	12.6	mg/kg	1.22	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.61
Arsenic	7440-38-2	8.1	mg/kg	1.4		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		1.4
Arsenic	7440-38-2	19.6	mg/kg	2.6		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		2.6
Arsenic	7440-38-2	9.4	mg/kg	1.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		1.7
Arsenic	7440-38-2	14	mg/kg	1.3		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.3
Arsenic	7440-38-2	31.2	mg/kg	2.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		2.4
Barium	7440-39-3	32.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Barium	7440-39-3	83.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Barium	7440-39-3	107	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Barium	7440-39-3	105	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Barium	7440-39-3	82.7	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Barium	7440-39-3	62.6	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Barium	7440-39-3	84.4	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Barium	7440-39-3	84.9	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Barium	7440-39-3	43	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		28.25
Barium	7440-39-3	163	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Barium	7440-39-3	41.3	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4
Barium	7440-39-3	160	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Barium	7440-39-3	132	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Benzo(a)anthracene	56-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)anthracene	56-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)anthracene	56-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)anthracene	56-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)anthracene	56-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)anthracene	56-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)anthracene	56-55-3	0.8555	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.137
Benzo(a)anthracene	56-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)anthracene	56-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(a)pyrene	50-32-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)pyrene	50-32-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)pyrene	50-32-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)pyrene	50-32-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)pyrene	50-32-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)pyrene	50-32-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)pyrene	50-32-8	0.721	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.137
Benzo(a)pyrene	50-32-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)pyrene	50-32-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(b)fluoranthene	205-99-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0684
Benzo(b)fluoranthene	205-99-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0816
Benzo(b)fluoranthene	205-99-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0808
Benzo(b)fluoranthene	205-99-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0764
Benzo(b)fluoranthene	205-99-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.395
Benzo(b)fluoranthene	205-99-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0746
Benzo(b)fluoranthene	205-99-2	1.205	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.3475
Benzo(b)fluoranthene	205-99-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0894
Benzo(b)fluoranthene	205-99-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(ghi)perylene	191-24-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Benzo(ghi)perylene	191-24-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzo(ghi)perylene	191-24-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzo(ghi)perylene	191-24-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzo(ghi)perylene	191-24-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzo(ghi)perylene	191-24-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzo(ghi)perylene	191-24-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzo(ghi)perylene	191-24-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzo(ghi)perylene	191-24-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(k)fluoranthene	207-08-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.124
Benzo(k)fluoranthene	207-08-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.148
Benzo(k)fluoranthene	207-08-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Benzo(k)fluoranthene	207-08-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.139
Benzo(k)fluoranthene	207-08-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.719
Benzo(k)fluoranthene	207-08-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.136
Benzo(k)fluoranthene	207-08-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.633
Benzo(k)fluoranthene	207-08-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.163
Benzo(k)fluoranthene	207-08-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzoic acid	65-85-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzoic acid	65-85-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzoic acid	65-85-0	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzoic acid	65-85-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzoic acid	65-85-0	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzoic acid	65-85-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzoic acid	65-85-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzoic acid	65-85-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzyl alcohol	100-51-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzyl alcohol	100-51-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzyl alcohol	100-51-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzyl alcohol	100-51-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzyl alcohol	100-51-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzyl alcohol	100-51-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzyl alcohol	100-51-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzyl alcohol	100-51-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Beryllium	7440-41-7	5.74	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Beryllium	7440-41-7	10.8	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Beryllium	7440-41-7	13.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Beryllium	7440-41-7	16.5	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Beryllium	7440-41-7	13.6	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Beryllium	7440-41-7	11.5	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Beryllium	7440-41-7	11.1	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Beryllium	7440-41-7	8.94	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Beryllium	7440-41-7	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.71
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	1.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Bis(2-chloroethoxy)methane	111-91-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00863
Bis(2-chloroethoxy)methane	111-91-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0103
Bis(2-chloroethoxy)methane	111-91-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0102
Bis(2-chloroethoxy)methane	111-91-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00963
Bis(2-chloroethoxy)methane	111-91-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0498
Bis(2-chloroethoxy)methane	111-91-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00941
Bis(2-chloroethoxy)methane	111-91-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.04385
Bis(2-chloroethoxy)methane	111-91-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Bis(2-chloroethoxy)methane	111-91-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Bis(2-chloroethoxy)methane	111-91-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroethyl)ether	111-44-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0125
Bis(2-chloroethyl)ether	111-44-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0124
Bis(2-chloroethyl)ether	111-44-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0117
Bis(2-chloroethyl)ether	111-44-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0605
Bis(2-chloroethyl)ether	111-44-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0114
Bis(2-chloroethyl)ether	111-44-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.05325
Bis(2-chloroethyl)ether	111-44-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0137
Bis(2-chloroethyl)ether	111-44-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroisopropyl)ether	108-60-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0179
Bis(2-chloroisopropyl)ether	108-60-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Bis(2-chloroisopropyl)ether	108-60-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0211
Bis(2-chloroisopropyl)ether	108-60-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.02
Bis(2-chloroisopropyl)ether	108-60-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Bis(2-chloroisopropyl)ether	108-60-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0195
Bis(2-chloroisopropyl)ether	108-60-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0909
Bis(2-chloroisopropyl)ether	108-60-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0234
Bis(2-chloroisopropyl)ether	108-60-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-ethylhexyl)phthalate	117-81-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.038
Bis(2-ethylhexyl)phthalate	117-81-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0453
Bis(2-ethylhexyl)phthalate	117-81-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0448
Bis(2-ethylhexyl)phthalate	117-81-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0424
Bis(2-ethylhexyl)phthalate	117-81-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.219
Bis(2-ethylhexyl)phthalate	117-81-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0414
Bis(2-ethylhexyl)phthalate	117-81-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.193
Bis(2-ethylhexyl)phthalate	117-81-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0496
Bis(2-ethylhexyl)phthalate	117-81-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bromophenyl phenyl ether, 4-	101-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Bromophenyl phenyl ether, 4-	101-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Bromophenyl phenyl ether, 4-	101-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Bromophenyl phenyl ether, 4-	101-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Bromophenyl phenyl ether, 4-	101-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Bromophenyl phenyl ether, 4-	101-55-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
Bromophenyl phenyl ether, 4-	101-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Bromophenyl phenyl ether, 4-	101-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Butyl benzyl phthalate	85-68-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Butyl benzyl phthalate	85-68-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Butyl benzyl phthalate	85-68-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Butyl benzyl phthalate	85-68-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186
Butyl benzyl phthalate	85-68-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Butyl benzyl phthalate	85-68-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Butyl benzyl phthalate	85-68-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08465
Butyl benzyl phthalate	85-68-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217
Butyl benzyl phthalate	85-68-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Cadmium	7440-43-9	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Cadmium	7440-43-9	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Cadmium	7440-43-9	0.263	mg/kg	0.526	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.263
Cadmium	7440-43-9	0.2655	mg/kg	0.531	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.266
Cadmium	7440-43-9	0.2755	mg/kg	0.551	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.276
Cadmium	7440-43-9	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Cadmium	7440-43-9	0.2603	mg/kg	0.476	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JU	0.2375
Cadmium	7440-43-9	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Cadmium	7440-43-9	0.14	mg/kg	0.28	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.28
Cadmium	7440-43-9	0.26	mg/kg	0.52	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	0.52
Cadmium	7440-43-9	0.165	mg/kg	0.33	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.33
Cadmium	7440-43-9	0.13	mg/kg	0.26	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.26
Cadmium	7440-43-9	0.245	mg/kg	0.49	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.49
Calcium	7440-70-2	14400	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Calcium	7440-70-2	18800	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76
Calcium	7440-70-2	9390	mg/kg	5.23		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.61
Calcium	7440-70-2	3330	mg/kg	5.11		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.56
Calcium	7440-70-2	35100	mg/kg	5.16		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.58
Calcium	7440-70-2	4580	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Calcium	7440-70-2	12400	mg/kg	4.76		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		2.38
Calcium	7440-70-2	15600	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Calcium	7440-70-2	3840	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Calcium	7440-70-2	6600	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Calcium	7440-70-2	5590	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Calcium	7440-70-2	6080	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Calcium	7440-70-2	59100	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Carbazole	86-74-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.041
Carbazole	86-74-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.049
Carbazole	86-74-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0485
Carbazole	86-74-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0458
Carbazole	86-74-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.237
Carbazole	86-74-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0448
Carbazole	86-74-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2085
Carbazole	86-74-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0536
Carbazole	86-74-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloro-3-methylphenol, 4-	59-50-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Chloro-3-methylphenol, 4-	59-50-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Chloro-3-methylphenol, 4-	59-50-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Chloro-3-methylphenol, 4-	59-50-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Chloro-3-methylphenol, 4-	59-50-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584
Chloro-3-methylphenol, 4-	59-50-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Chloro-3-methylphenol, 4-	59-50-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0514
Chloro-3-methylphenol, 4-	59-50-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132
Chloro-3-methylphenol, 4-	59-50-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloroaniline, 4-	106-47-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0356
Chloroaniline, 4-	106-47-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0425
Chloroaniline, 4-	106-47-8	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0421
Chloroaniline, 4-	106-47-8	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0398
Chloroaniline, 4-	106-47-8	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.206
Chloroaniline, 4-	106-47-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0389
Chloroaniline, 4-	106-47-8	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.181
Chloroaniline, 4-	106-47-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Chloroaniline, 4-	106-47-8	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloronaphthalene, 2-	91-58-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00653

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Chloronaphthalene, 2-	91-58-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00779
Chloronaphthalene, 2-	91-58-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Chloronaphthalene, 2-	91-58-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00729
Chloronaphthalene, 2-	91-58-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0377
Chloronaphthalene, 2-	91-58-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00712
Chloronaphthalene, 2-	91-58-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0332
Chloronaphthalene, 2-	91-58-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00854
Chloronaphthalene, 2-	91-58-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenol, 2-	95-57-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00505
Chlorophenol, 2-	95-57-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00603
Chlorophenol, 2-	95-57-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00597
Chlorophenol, 2-	95-57-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00564
Chlorophenol, 2-	95-57-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0292
Chlorophenol, 2-	95-57-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00551
Chlorophenol, 2-	95-57-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0257
Chlorophenol, 2-	95-57-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0066
Chlorophenol, 2-	95-57-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenyl phenyl ether, 4-	7005-72-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0314
Chlorophenyl phenyl ether, 4-	7005-72-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0375
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0371
Chlorophenyl phenyl ether, 4-	7005-72-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0351
Chlorophenyl phenyl ether, 4-	7005-72-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.182
Chlorophenyl phenyl ether, 4-	7005-72-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0343
Chlorophenyl phenyl ether, 4-	7005-72-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1595
Chlorophenyl phenyl ether, 4-	7005-72-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0411
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chromium	7440-47-3	10.6	mg/kg	0.496		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Chromium	7440-47-3	12.4	mg/kg	0.576		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288
Chromium	7440-47-3	13.6	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Chromium	7440-47-3	12	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Chromium	7440-47-3	16.4	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Chromium	7440-47-3	14.6	mg/kg	0.567		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Chromium	7440-47-3	13	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.238
Chromium	7440-47-3	10.7	mg/kg	0.605		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Chromium	7440-47-3	13.2	mg/kg	0.71		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		0.71
Chromium	7440-47-3	12.2	mg/kg	1.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		1.3
Chromium	7440-47-3	18.1	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Chromium	7440-47-3	10.5	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Chromium	7440-47-3	13.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Chrysene	218-01-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0163
Chrysene	218-01-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0194
Chrysene	218-01-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0192
Chrysene	218-01-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0182
Chrysene	218-01-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.094
Chrysene	218-01-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0177
Chrysene	218-01-9	0.85	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0827
Chrysene	218-01-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Chrysene	218-01-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Cobalt	7440-48-4	5.47	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Cobalt	7440-48-4	8.57	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Cobalt	7440-48-4	9.92	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Cobalt	7440-48-4	8.92	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Cobalt	7440-48-4	8.36	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Cobalt	7440-48-4	10.1	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Cobalt	7440-48-4	6.715	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Cobalt	7440-48-4	6.2	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Cobalt	7440-48-4	5.75	mg/kg	7.1	/U	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	U	7.1
Cobalt	7440-48-4	6.8	mg/kg	6.5		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		6.5
Cobalt	7440-48-4	4.2	mg/kg	8.4	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	8.4
Cobalt	7440-48-4	8.6	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Cobalt	7440-48-4	26	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Copper	7440-50-8	15.4	mg/kg	0.496	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Copper	7440-50-8	27.3	mg/kg	0.576	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288
Copper	7440-50-8	30.5	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Copper	7440-50-8	50	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Copper	7440-50-8	47.9	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Copper	7440-50-8	20.5	mg/kg	0.567	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Copper	7440-50-8	31.9	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.238
Copper	7440-50-8	18.2	mg/kg	0.605	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Copper	7440-50-8	15.25	mg/kg	3.55		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		3.55
Copper	7440-50-8	32.1	mg/kg	3.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.3
Copper	7440-50-8	13.5	mg/kg	4.2		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		4.2
Copper	7440-50-8	24	mg/kg	3.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		3.2
Copper	7440-50-8	34.2	mg/kg	6.1		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		6.1
Dibenz(a,h)anthracene	53-70-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0928
Dibenz(a,h)anthracene	53-70-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.111
Dibenz(a,h)anthracene	53-70-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.11
Dibenz(a,h)anthracene	53-70-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.104
Dibenz(a,h)anthracene	53-70-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.536
Dibenz(a,h)anthracene	53-70-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.101
Dibenz(a,h)anthracene	53-70-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.472
Dibenz(a,h)anthracene	53-70-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.121
Dibenz(a,h)anthracene	53-70-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dibenzofuran	132-64-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0069
Dibenzofuran	132-64-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00823
Dibenzofuran	132-64-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00815
Dibenzofuran	132-64-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Dibenzofuran	132-64-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0399
Dibenzofuran	132-64-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00753
Dibenzofuran	132-64-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0351
Dibenzofuran	132-64-9	0.0757	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.00902
Dibenzofuran	132-64-9	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,2-	95-50-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00949
Dichlorobenzene, 1,2-	95-50-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Dichlorobenzene, 1,2-	95-50-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0112
Dichlorobenzene, 1,2-	95-50-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0106
Dichlorobenzene, 1,2-	95-50-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0548
Dichlorobenzene, 1,2-	95-50-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0104
Dichlorobenzene, 1,2-	95-50-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.04825
Dichlorobenzene, 1,2-	95-50-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0124
Dichlorobenzene, 1,2-	95-50-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,3-	541-73-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0149
Dichlorobenzene, 1,3-	541-73-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0178
Dichlorobenzene, 1,3-	541-73-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0176

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dichlorobenzene, 1,3-	541-73-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0167
Dichlorobenzene, 1,3-	541-73-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0861
Dichlorobenzene, 1,3-	541-73-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0163
Dichlorobenzene, 1,3-	541-73-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07585
Dichlorobenzene, 1,3-	541-73-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0195
Dichlorobenzene, 1,3-	541-73-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,4-	106-46-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00801
Dichlorobenzene, 1,4-	106-46-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00956
Dichlorobenzene, 1,4-	106-46-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00946
Dichlorobenzene, 1,4-	106-46-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00894
Dichlorobenzene, 1,4-	106-46-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0463
Dichlorobenzene, 1,4-	106-46-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00874
Dichlorobenzene, 1,4-	106-46-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0407
Dichlorobenzene, 1,4-	106-46-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0105
Dichlorobenzene, 1,4-	106-46-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzidine, 3,3'-	91-94-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
Dichlorobenzidine, 3,3'-	91-94-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
Dichlorobenzidine, 3,3'-	91-94-1	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
Dichlorobenzidine, 3,3'-	91-94-1	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
Dichlorobenzidine, 3,3'-	91-94-1	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
Dichlorobenzidine, 3,3'-	91-94-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
Dichlorobenzidine, 3,3'-	91-94-1	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2065
Dichlorobenzidine, 3,3'-	91-94-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531
Dichlorobenzidine, 3,3'-	91-94-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorophenol, 2,4-	120-83-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Dichlorophenol, 2,4-	120-83-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Dichlorophenol, 2,4-	120-83-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Dichlorophenol, 2,4-	120-83-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Dichlorophenol, 2,4-	120-83-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Dichlorophenol, 2,4-	120-83-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
Dichlorophenol, 2,4-	120-83-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Dichlorophenol, 2,4-	120-83-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Diethyl phthalate	84-66-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Diethyl phthalate	84-66-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Diethyl phthalate	84-66-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Diethyl phthalate	84-66-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186
Diethyl phthalate	84-66-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Diethyl phthalate	84-66-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Diethyl phthalate	84-66-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08465
Diethyl phthalate	84-66-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217
Diethyl phthalate	84-66-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethyl phthalate	131-11-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126
Dimethyl phthalate	131-11-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Dimethyl phthalate	131-11-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Dimethyl phthalate	131-11-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dimethyl phthalate	131-11-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Dimethyl phthalate	131-11-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Dimethyl phthalate	131-11-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0639
Dimethyl phthalate	131-11-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Dimethyl phthalate	131-11-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethylphenol, 2,4-	105-67-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0108
Dimethylphenol, 2,4-	105-67-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dimethylphenol, 2,4-	105-67-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0128
Dimethylphenol, 2,4-	105-67-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0121
Dimethylphenol, 2,4-	105-67-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0626
Dimethylphenol, 2,4-	105-67-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0118
Dimethylphenol, 2,4-	105-67-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.05515
Dimethylphenol, 2,4-	105-67-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0142
Dimethylphenol, 2,4-	105-67-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-butyl phthalate	84-74-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Di-n-butyl phthalate	84-74-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Di-n-butyl phthalate	84-74-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Di-n-butyl phthalate	84-74-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Di-n-butyl phthalate	84-74-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Di-n-butyl phthalate	84-74-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Di-n-butyl phthalate	84-74-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0451
Di-n-butyl phthalate	84-74-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Di-n-butyl phthalate	84-74-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitro-2-methylphenol, 4,6-	534-52-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0413
Dinitro-2-methylphenol, 4,6-	534-52-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0492
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0488
Dinitro-2-methylphenol, 4,6-	534-52-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0461
Dinitro-2-methylphenol, 4,6-	534-52-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.238
Dinitro-2-methylphenol, 4,6-	534-52-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.045
Dinitro-2-methylphenol, 4,6-	534-52-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.21
Dinitro-2-methylphenol, 4,6-	534-52-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.054
Dinitro-2-methylphenol, 4,6-	534-52-1	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitrobenzene, 1,3-	99-65-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrobenzene, 1,3-	99-65-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrobenzene, 1,3-	99-65-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrobenzene, 1,3-	99-65-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrobenzene, 1,3-	99-65-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrobenzene, 1,3-	99-65-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Dinitrobenzene, 1,3-	99-65-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrophenol, 2,4-	51-28-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0654
Dinitrophenol, 2,4-	51-28-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0781
Dinitrophenol, 2,4-	51-28-5	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0773
Dinitrophenol, 2,4-	51-28-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0731
Dinitrophenol, 2,4-	51-28-5	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.378
Dinitrophenol, 2,4-	51-28-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0714
Dinitrophenol, 2,4-	51-28-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.3325
Dinitrophenol, 2,4-	51-28-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0855
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitrophenol, 2,4-	51-28-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitrotoluene, 2,4-	121-14-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0144
Dinitrotoluene, 2,4-	121-14-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,4-	121-14-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0172
Dinitrotoluene, 2,4-	121-14-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,4-	121-14-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.017
Dinitrotoluene, 2,4-	121-14-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,4-	121-14-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0161
Dinitrotoluene, 2,4-	121-14-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,4-	121-14-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0833
Dinitrotoluene, 2,4-	121-14-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,4-	121-14-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0157
Dinitrotoluene, 2,4-	121-14-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,4-	121-14-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.11295
Dinitrotoluene, 2,4-	121-14-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0188
Dinitrotoluene, 2,4-	121-14-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,4-	121-14-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.10585
Dinitrotoluene, 2,4-	121-14-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitrotoluene, 2,6-	606-20-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00986
Dinitrotoluene, 2,6-	606-20-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,6-	606-20-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0118
Dinitrotoluene, 2,6-	606-20-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,6-	606-20-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0116
Dinitrotoluene, 2,6-	606-20-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,6-	606-20-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.011
Dinitrotoluene, 2,6-	606-20-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,6-	606-20-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.057
Dinitrotoluene, 2,6-	606-20-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,6-	606-20-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0108
Dinitrotoluene, 2,6-	606-20-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,6-	606-20-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1011
Dinitrotoluene, 2,6-	606-20-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dinitrotoluene, 2,6-	606-20-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,6-	606-20-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0945
Dinitrotoluene, 2,6-	606-20-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,6-	606-20-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,6-	606-20-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-octyl phthalate	117-84-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0773
Di-n-octyl phthalate	117-84-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0922
Di-n-octyl phthalate	117-84-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0912
Di-n-octyl phthalate	117-84-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0863
Di-n-octyl phthalate	117-84-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.446
Di-n-octyl phthalate	117-84-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0843
Di-n-octyl phthalate	117-84-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.393
Di-n-octyl phthalate	117-84-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.101
Di-n-octyl phthalate	117-84-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
DIPHENYLAMINE	122-39-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
DIPHENYLAMINE	122-39-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
DIPHENYLAMINE	122-39-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
DIPHENYLAMINE	122-39-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
DIPHENYLAMINE	122-39-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
DIPHENYLAMINE	122-39-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
DIPHENYLAMINE	122-39-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2065
DIPHENYLAMINE	122-39-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Fluoranthene	206-44-0	0.0477	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.00887
Fluoranthene	206-44-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Fluoranthene	206-44-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Fluoranthene	206-44-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Fluoranthene	206-44-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Fluoranthene	206-44-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Fluoranthene	206-44-0	1.875	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0451
Fluoranthene	206-44-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Fluoranthene	206-44-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Fluorene	86-73-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0174
Fluorene	86-73-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0207
Fluorene	86-73-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0205
Fluorene	86-73-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Fluorene	86-73-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.1
Fluorene	86-73-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.019
Fluorene	86-73-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08835
Fluorene	86-73-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0227
Fluorene	86-73-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobenzene	118-74-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0255
Hexachlorobenzene	118-74-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0304
Hexachlorobenzene	118-74-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Hexachlorobenzene	118-74-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Hexachlorobenzene	118-74-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Hexachlorobenzene	118-74-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0278
Hexachlorobenzene	118-74-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.13
Hexachlorobenzene	118-74-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0333
Hexachlorobenzene	118-74-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobutadiene	87-68-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0389
Hexachlorobutadiene	87-68-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Hexachlorobutadiene	87-68-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.046
Hexachlorobutadiene	87-68-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Hexachlorobutadiene	87-68-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.225
Hexachlorobutadiene	87-68-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0425
Hexachlorobutadiene	87-68-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.198
Hexachlorobutadiene	87-68-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0509
Hexachlorobutadiene	87-68-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorocyclopentadiene	77-47-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0156
Hexachlorocyclopentadiene	77-47-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0154
Hexachlorocyclopentadiene	77-47-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
Hexachlorocyclopentadiene	77-47-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0755
Hexachlorocyclopentadiene	77-47-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0142
Hexachlorocyclopentadiene	77-47-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.06645
Hexachlorocyclopentadiene	77-47-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0171
Hexachlorocyclopentadiene	77-47-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachloroethane	67-72-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Hexachloroethane	67-72-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Hexachloroethane	67-72-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Hexachloroethane	67-72-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014
Hexachloroethane	67-72-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Hexachloroethane	67-72-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Hexachloroethane	67-72-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0639
Hexachloroethane	67-72-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Hexachloroethane	67-72-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
HMX	2691-41-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
HMX	2691-41-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
HMX	2691-41-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
HMX	2691-41-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
HMX	2691-41-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
HMX	2691-41-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
HMX	2691-41-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
HMX	2691-41-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Indeno(1,2,3-cd)pyrene	193-39-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.133
Indeno(1,2,3-cd)pyrene	193-39-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.159
Indeno(1,2,3-cd)pyrene	193-39-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.157
Indeno(1,2,3-cd)pyrene	193-39-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.149
Indeno(1,2,3-cd)pyrene	193-39-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.769
Indeno(1,2,3-cd)pyrene	193-39-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.145
Indeno(1,2,3-cd)pyrene	193-39-5	1.815	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.677
Indeno(1,2,3-cd)pyrene	193-39-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.174
Indeno(1,2,3-cd)pyrene	193-39-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Iron	7439-89-6	17200	mg/kg	3.97		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	B	1.99
Iron	7439-89-6	36500	mg/kg	4.61		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	B	2.3
Iron	7439-89-6	63100	mg/kg	20.9		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		10.5
Iron	7439-89-6	90300	mg/kg	20.5		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		10.2
Iron	7439-89-6	64800	mg/kg	20.6		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		10.3
Iron	7439-89-6	41100	mg/kg	4.54		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	B	2.27
Iron	7439-89-6	46500	mg/kg	12.855		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		6.44
Iron	7439-89-6	26500	mg/kg	4.84		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	B	2.42
Iron	7439-89-6	21600	mg/kg	14.15		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		14.15
Iron	7439-89-6	95100	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Iron	7439-89-6	29000	mg/kg	16.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		16.7
Iron	7439-89-6	70300	mg/kg	13		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		13
Iron	7439-89-6	73200	mg/kg	24.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		24.4
Isophorone	78-59-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Isophorone	78-59-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Isophorone	78-59-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Isophorone	78-59-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Isophorone	78-59-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Isophorone	78-59-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Isophorone	78-59-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02505
Isophorone	78-59-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Isophorone	78-59-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Lead	7439-92-1	6.61	mg/kg	0.46		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.23
Lead	7439-92-1	9.65	mg/kg	0.595		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.297
Lead	7439-92-1	9.59	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Lead	7439-92-1	11.3	mg/kg	0.531		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.266
Lead	7439-92-1	12.3	mg/kg	0.551		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.276
Lead	7439-92-1	8.3	mg/kg	0.577		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.288
Lead	7439-92-1	27.05	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.2375

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Lead	7439-92-1	6.28	mg/kg	0.61		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.305
Lead	7439-92-1	8.3	mg/kg	0.42		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		0.42
Lead	7439-92-1	5.9	mg/kg	0.79		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		0.79
Lead	7439-92-1	8.1	mg/kg	0.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.5
Lead	7439-92-1	4.9	mg/kg	0.39		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.39
Lead	7439-92-1	5.6	mg/kg	0.73		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		0.73
Magnesium	7439-95-4	5030	mg/kg	1.99		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.993
Magnesium	7439-95-4	5830	mg/kg	2.3		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.15
Magnesium	7439-95-4	1500	mg/kg	2.09		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.05
Magnesium	7439-95-4	782	mg/kg	2.05		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.02
Magnesium	7439-95-4	4010	mg/kg	2.06		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.03
Magnesium	7439-95-4	1730	mg/kg	2.27		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.13
Magnesium	7439-95-4	1915	mg/kg	1.9		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.9535
Magnesium	7439-95-4	3740	mg/kg	2.42		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.21
Magnesium	7439-95-4	1660	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Magnesium	7439-95-4	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Magnesium	7439-95-4	1470	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Magnesium	7439-95-4	651	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Magnesium	7439-95-4	3770	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Manganese	7439-96-5	263	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Manganese	7439-96-5	306	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Manganese	7439-96-5	252	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Manganese	7439-96-5	241	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Manganese	7439-96-5	305	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Manganese	7439-96-5	199	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Manganese	7439-96-5	342	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Manganese	7439-96-5	2810	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Manganese	7439-96-5	825	mg/kg	2.15	J	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		2.15
Manganese	7439-96-5	199	mg/kg	3.9		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.9
Manganese	7439-96-5	125	mg/kg	2.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		2.5
Manganese	7439-96-5	181	mg/kg	1.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.9
Manganese	7439-96-5	1370	mg/kg	3.7		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		3.7
Mercury	7439-97-6	0.0123	mg/kg	0.0246	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.0123
Mercury	7439-97-6	0.0357	mg/kg	0.03		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.015
Mercury	7439-97-6	0.0928	mg/kg	0.0296		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.0148
Mercury	7439-97-6	0.383	mg/kg	0.0274		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.0137
Mercury	7439-97-6	0.0756	mg/kg	0.0291		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.0146
Mercury	7439-97-6	0.0146	mg/kg	0.0248	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	J	0.0124
Mercury	7439-97-6	0.157	mg/kg	0.02555		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.0128
Mercury	7439-97-6	0.0383	mg/kg	0.0323		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.0162
Mercury	7439-97-6	0.07	mg/kg	0.14	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.14
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.085	mg/kg	0.17	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.17
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.12	mg/kg	0.24	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.24
Methylnaphthalene, 2-	91-57-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.108
Methylnaphthalene, 2-	91-57-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.128
Methylnaphthalene, 2-	91-57-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.127
Methylnaphthalene, 2-	91-57-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.12
Methylnaphthalene, 2-	91-57-6	0.942	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.622
Methylnaphthalene, 2-	91-57-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.117
Methylnaphthalene, 2-	91-57-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.548
Methylnaphthalene, 2-	91-57-6	0.363	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.141
Methylnaphthalene, 2-	91-57-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 2-	95-48-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00616
Methylphenol, 2-	95-48-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00735
Methylphenol, 2-	95-48-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00728
Methylphenol, 2-	95-48-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00688
Methylphenol, 2-	95-48-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0356
Methylphenol, 2-	95-48-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00672
Methylphenol, 2-	95-48-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0313
Methylphenol, 2-	95-48-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00805

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Methylphenol, 2-	95-48-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 4-	106-44-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0128
Methylphenol, 4-	106-44-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0153
Methylphenol, 4-	106-44-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0151
Methylphenol, 4-	106-44-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0143
Methylphenol, 4-	106-44-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.074
Methylphenol, 4-	106-44-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.014
Methylphenol, 4-	106-44-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.06515
Methylphenol, 4-	106-44-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0167
Methylphenol, 4-	106-44-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Naphthalene	91-20-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00974
Naphthalene	91-20-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Naphthalene	91-20-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0115
Naphthalene	91-20-3	0.0661	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0109
Naphthalene	91-20-3	0.764	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0562
Naphthalene	91-20-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0106
Naphthalene	91-20-3	0.6595	mg/kg	2.085	JU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JU	0.0495
Naphthalene	91-20-3	0.247	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.0127
Naphthalene	91-20-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nickel	7440-02-0	3.93	mg/kg	0.298	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.149
Nickel	7440-02-0	0.173	mg/kg	0.346	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.173
Nickel	7440-02-0	0.157	mg/kg	0.314	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.157
Nickel	7440-02-0	0.1535	mg/kg	0.307	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.153
Nickel	7440-02-0	0.1545	mg/kg	0.309	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.155
Nickel	7440-02-0	0.17	mg/kg	0.34	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.17
Nickel	7440-02-0	0.1428	mg/kg	0.2855	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	UU	0.143
Nickel	7440-02-0	0.1815	mg/kg	0.363	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.181
Nickel	7440-02-0	28.7	mg/kg	5.65		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		5.65
Nickel	7440-02-0	16.1	mg/kg	5.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	21.1	mg/kg	6.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		6.7
Nickel	7440-02-0	16.7	mg/kg	5.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	79.2	mg/kg	9.8		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		9.8
Nitroaniline, 2-	88-74-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0177
Nitroaniline, 2-	88-74-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0212
Nitroaniline, 2-	88-74-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.021
Nitroaniline, 2-	88-74-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0198
Nitroaniline, 2-	88-74-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Nitroaniline, 2-	88-74-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0194
Nitroaniline, 2-	88-74-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.09025
Nitroaniline, 2-	88-74-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0232
Nitroaniline, 2-	88-74-4	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 3-	99-09-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0139
Nitroaniline, 3-	99-09-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0166
Nitroaniline, 3-	99-09-2	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Nitroaniline, 3-	99-09-2	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0155
Nitroaniline, 3-	99-09-2	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0804
Nitroaniline, 3-	99-09-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0152
Nitroaniline, 3-	99-09-2	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07085
Nitroaniline, 3-	99-09-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0182
Nitroaniline, 3-	99-09-2	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 4-	100-01-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.145
Nitroaniline, 4-	100-01-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.173
Nitroaniline, 4-	100-01-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.172
Nitroaniline, 4-	100-01-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.162
Nitroaniline, 4-	100-01-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.84
Nitroaniline, 4-	100-01-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.159
Nitroaniline, 4-	100-01-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.7395
Nitroaniline, 4-	100-01-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.19
Nitroaniline, 4-	100-01-6	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitrobenzene	98-95-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0134
Nitrobenzene	98-95-3	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrobenzene	98-95-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.016
Nitrobenzene	98-95-3	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrobenzene	98-95-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0159
Nitrobenzene	98-95-3	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrobenzene	98-95-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.015
Nitrobenzene	98-95-3	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrobenzene	98-95-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0776
Nitrobenzene	98-95-3	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrobenzene	98-95-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0147
Nitrobenzene	98-95-3	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrobenzene	98-95-3	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1104
Nitrobenzene	98-95-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0176
Nitrobenzene	98-95-3	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrobenzene	98-95-3	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1034
Nitrobenzene	98-95-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrophenol, 2-	88-75-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0145
Nitrophenol, 2-	88-75-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0173
Nitrophenol, 2-	88-75-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0172
Nitrophenol, 2-	88-75-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0162
Nitrophenol, 2-	88-75-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.084
Nitrophenol, 2-	88-75-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0159
Nitrophenol, 2-	88-75-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07395
Nitrophenol, 2-	88-75-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.019
Nitrophenol, 2-	88-75-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrophenol, 4-	100-02-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0333
Nitrophenol, 4-	100-02-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0397
Nitrophenol, 4-	100-02-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0393
Nitrophenol, 4-	100-02-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0372
Nitrophenol, 4-	100-02-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.192
Nitrophenol, 4-	100-02-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0363
Nitrophenol, 4-	100-02-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1695
Nitrophenol, 4-	100-02-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0435
Nitrophenol, 4-	100-02-7	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitrotoluene, 2-	88-72-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 2-	88-72-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitrotoluene, 2-	88-72-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 2-	88-72-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 2-	88-72-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 2-	88-72-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 2-	88-72-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 2-	88-72-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 3-	99-08-1	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 3-	99-08-1	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 3-	99-08-1	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 3-	99-08-1	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 3-	99-08-1	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 3-	99-08-1	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 3-	99-08-1	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 3-	99-08-1	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 4-	99-99-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 4-	99-99-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 4-	99-99-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 4-	99-99-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 4-	99-99-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 4-	99-99-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 4-	99-99-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 4-	99-99-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
n-Nitrosodimethylamine	62-75-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0123
n-Nitrosodimethylamine	62-75-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0147
n-Nitrosodimethylamine	62-75-9	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
n-Nitrosodimethylamine	62-75-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0138
n-Nitrosodimethylamine	62-75-9	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0712
n-Nitrosodimethylamine	62-75-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0134
n-Nitrosodimethylamine	62-75-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0627
n-Nitrosodimethylamine	62-75-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0161
n-Nitroso-di-n-propylamine	621-64-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
n-Nitroso-di-n-propylamine	621-64-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
n-Nitroso-di-n-propylamine	621-64-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
n-Nitroso-di-n-propylamine	621-64-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
n-Nitroso-di-n-propylamine	621-64-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
n-Nitroso-di-n-propylamine	621-64-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
n-Nitroso-di-n-propylamine	621-64-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
n-Nitroso-di-n-propylamine	621-64-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
n-Nitrosodiphenylamine	86-30-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00579
n-Nitrosodiphenylamine	86-30-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00691
n-Nitrosodiphenylamine	86-30-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00684
n-Nitrosodiphenylamine	86-30-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00647
n-Nitrosodiphenylamine	86-30-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0335
n-Nitrosodiphenylamine	86-30-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00632
n-Nitrosodiphenylamine	86-30-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02945
n-Nitrosodiphenylamine	86-30-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00757
n-Nitrosodiphenylamine	86-30-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Pentachlorophenol	87-86-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0369
Pentachlorophenol	87-86-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.044
Pentachlorophenol	87-86-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Pentachlorophenol	87-86-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0411
Pentachlorophenol	87-86-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.213
Pentachlorophenol	87-86-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0402
Pentachlorophenol	87-86-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1875
Pentachlorophenol	87-86-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0482
Pentachlorophenol	87-86-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Pentachlorophenol	87-86-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Phenanthrene	85-01-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00998
Phenanthrene	85-01-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0119
Phenanthrene	85-01-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0118
Phenanthrene	85-01-8	0.055	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0111
Phenanthrene	85-01-8	0.275	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0577
Phenanthrene	85-01-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0109
Phenanthrene	85-01-8	0.831	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0508
Phenanthrene	85-01-8	0.156	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.013
Phenanthrene	85-01-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Phenol	108-95-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Phenol	108-95-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Phenol	108-95-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Phenol	108-95-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Phenol	108-95-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Phenol	108-95-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Phenol	108-95-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02505
Phenol	108-95-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Phenol	108-95-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Potassium	7440-09-7	577	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		12.4
Potassium	7440-09-7	1190	mg/kg	28.8	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		14.4
Potassium	7440-09-7	1260	mg/kg	26.1		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		13.1
Potassium	7440-09-7	1280	mg/kg	25.6		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		12.8
Potassium	7440-09-7	1160	mg/kg	25.8		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		12.9
Potassium	7440-09-7	643	mg/kg	28.4	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		14.2
Potassium	7440-09-7	654	mg/kg	23.8		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		11.9
Potassium	7440-09-7	1040	mg/kg	30.2	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		15.1
Potassium	7440-09-7	873.5	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Potassium	7440-09-7	1090	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Potassium	7440-09-7	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Potassium	7440-09-7	781	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Potassium	7440-09-7	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Pyrene	129-00-0	0.0378	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.0164
Pyrene	129-00-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0196
Pyrene	129-00-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Pyrene	129-00-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0183
Pyrene	129-00-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0947
Pyrene	129-00-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0179
Pyrene	129-00-0	1.32	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.08335
Pyrene	129-00-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0214
Pyrene	129-00-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
RDX	121-82-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
RDX	121-82-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
RDX	121-82-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
RDX	121-82-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
RDX	121-82-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
RDX	121-82-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
RDX	121-82-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Selenium	7782-49-2	0.4595	mg/kg	0.919	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.46
Selenium	7782-49-2	0.618	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	J	0.595
Selenium	7782-49-2	0.567	mg/kg	1.05	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.526
Selenium	7782-49-2	0.6	mg/kg	1.06	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.531

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Selenium	7782-49-2	0.592	mg/kg	1.1	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.551
Selenium	7782-49-2	0.575	mg/kg	1.15	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.577
Selenium	7782-49-2	0.4973	mg/kg	0.9515	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JU	0.476
Selenium	7782-49-2	0.61	mg/kg	1.22	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.61
Selenium	7782-49-2	0.665	mg/kg	0.71	/U	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	U	0.71
Selenium	7782-49-2	0.65	mg/kg	1.3	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	1.3
Selenium	7782-49-2	1.2	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Selenium	7782-49-2	2.7	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Selenium	7782-49-2	2.6	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Silver	7440-22-4	0.248	mg/kg	0.496	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.248
Silver	7440-22-4	0.288	mg/kg	0.576	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.288
Silver	7440-22-4	0.2615	mg/kg	0.523	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.261
Silver	7440-22-4	0.2555	mg/kg	0.511	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.256
Silver	7440-22-4	0.258	mg/kg	0.516	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.258
Silver	7440-22-4	0.2835	mg/kg	0.567	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.284
Silver	7440-22-4	0.238	mg/kg	0.476	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	UU	0.238
Silver	7440-22-4	0.3025	mg/kg	0.605	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.302
Silver	7440-22-4	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.71
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.6	mg/kg	1.2	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1.2
Sodium	7440-23-5	57.6	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Sodium	7440-23-5	114	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76
Sodium	7440-23-5	96.8	mg/kg	10.5		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		5.23
Sodium	7440-23-5	119	mg/kg	10.2		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		5.11
Sodium	7440-23-5	165	mg/kg	10.3		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		5.16
Sodium	7440-23-5	70.4	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Sodium	7440-23-5	89.15	mg/kg	9.535	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		4.76
Sodium	7440-23-5	161	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Sodium	7440-23-5	353.5	mg/kg	707	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	707
Sodium	7440-23-5	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Sodium	7440-23-5	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Sodium	7440-23-5	324	mg/kg	648	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	648
Sodium	7440-23-5	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Tetryl	479-45-8	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Tetryl	479-45-8	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Tetryl	479-45-8	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Tetryl	479-45-8	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Tetryl	479-45-8	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Tetryl	479-45-8	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Tetryl	479-45-8	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Tetryl	479-45-8	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Thallium	7440-28-0	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Thallium	7440-28-0	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Thallium	7440-28-0	0.563	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Thallium	7440-28-0	0.356	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Thallium	7440-28-0	0.303	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Thallium	7440-28-0	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Thallium	7440-28-0	0.274	mg/kg	0.476	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JJ	0.2375
Thallium	7440-28-0	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Thallium	7440-28-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	1.4
Thallium	7440-28-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Thallium	7440-28-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Thallium	7440-28-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Thallium	7440-28-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Total organic carbon	10-35-5	55.3	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	TOC-W	REG	8-Dec-08	0.5	1.5	B	0.62
Total organic carbon	10-35-5	65	mg/kg	130	U	PBOW99-SBA102A	PBOW99SBA102A	TOC	REG	10-Jun-99	0	1	U	130
Trichlorobenzene, 1,2,4-	120-82-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Trichlorobenzene, 1,2,4-	120-82-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Trichlorobenzene, 1,2,4-	120-82-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Trichlorobenzene, 1,2,4-	120-82-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Trichlorobenzene, 1,2,4-	120-82-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584
Trichlorobenzene, 1,2,4-	120-82-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Trichlorobenzene, 1,2,4-	120-82-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0514
Trichlorobenzene, 1,2,4-	120-82-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132

Table E-1
Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Trichlorobenzene, 1,2,4-	120-82-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorophenol, 2,4,5-	95-95-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0352
Trichlorophenol, 2,4,5-	95-95-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.042
Trichlorophenol, 2,4,5-	95-95-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0416
Trichlorophenol, 2,4,5-	95-95-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0394
Trichlorophenol, 2,4,5-	95-95-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.204
Trichlorophenol, 2,4,5-	95-95-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0384
Trichlorophenol, 2,4,5-	95-95-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.179
Trichlorophenol, 2,4,5-	95-95-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0461
Trichlorophenol, 2,4,5-	95-95-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorophenol, 2,4,6-	88-06-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0277
Trichlorophenol, 2,4,6-	88-06-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0331
Trichlorophenol, 2,4,6-	88-06-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0327
Trichlorophenol, 2,4,6-	88-06-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.031
Trichlorophenol, 2,4,6-	88-06-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.16
Trichlorophenol, 2,4,6-	88-06-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0302
Trichlorophenol, 2,4,6-	88-06-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.141
Trichlorophenol, 2,4,6-	88-06-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0362
Trichlorophenol, 2,4,6-	88-06-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trinitrobenzene, 1,3,5-	99-35-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrobenzene, 1,3,5-	99-35-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrobenzene, 1,3,5-	99-35-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrobenzene, 1,3,5-	99-35-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrobenzene, 1,3,5-	99-35-4	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrobenzene, 1,3,5-	99-35-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Trinitrobenzene, 1,3,5-	99-35-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Trinitrotoluene, 2,4,6-	118-96-7	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrotoluene, 2,4,6-	118-96-7	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrotoluene, 2,4,6-	118-96-7	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrotoluene, 2,4,6-	118-96-7	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrotoluene, 2,4,6-	118-96-7	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrotoluene, 2,4,6-	118-96-7	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Trinitrotoluene, 2,4,6-	118-96-7	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Vanadium	7440-62-2	20.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Vanadium	7440-62-2	26.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Vanadium	7440-62-2	29.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Vanadium	7440-62-2	32.4	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Vanadium	7440-62-2	27.9	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Vanadium	7440-62-2	28.2	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Vanadium	7440-62-2	21.85	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Vanadium	7440-62-2	20.7	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Vanadium	7440-62-2	20.25	mg/kg	7.1		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		7.1
Vanadium	7440-62-2	17.8	mg/kg	13.1		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		13.1
Vanadium	7440-62-2	39.2	mg/kg	8.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		8.4
Vanadium	7440-62-2	14.4	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Vanadium	7440-62-2	23	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Zinc	7440-66-6	44.4	mg/kg	2.48		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.24
Zinc	7440-66-6	55.2	mg/kg	2.88		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.44
Zinc	7440-66-6	57.1	mg/kg	2.61		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.31
Zinc	7440-66-6	55.3	mg/kg	2.56		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.28
Zinc	7440-66-6	62.8	mg/kg	2.58		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.29
Zinc	7440-66-6	85.4	mg/kg	2.84		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.42

Table E-1

Surface Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Zinc	7440-66-6	63.4	mg/kg	2.38		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		1.19
Zinc	7440-66-6	34.8	mg/kg	3.02		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.51
Zinc	7440-66-6	63.15	mg/kg	2.8		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	MBDMBD	2.8
Zinc	7440-66-6	2.6	mg/kg	5.2	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	MBD	5.2
Zinc	7440-66-6	43.5	mg/kg	3.3		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	MBD	3.3
Zinc	7440-66-6	1.3	mg/kg	2.6	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	MBD	2.6
Zinc	7440-66-6	95.8	mg/kg	4.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	MBD	4.9

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Acenaphthene	83-32-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00882
Acenaphthene	83-32-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00873
Acenaphthene	83-32-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00826
Acenaphthene	83-32-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0427
Acenaphthene	83-32-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0376
Acenaphthene	83-32-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00966
Acenaphthene	83-32-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Acenaphthene	83-32-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00739
Acenaphthene	83-32-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00807
Acenaphthene	83-32-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Acenaphthene	83-32-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00755
Acenaphthene	83-32-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00696
Acenaphthene	83-32-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.007255
Acenaphthene	83-32-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00722
Acenaphthene	83-32-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00843
Acenaphthene	83-32-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00727
Acenaphthene	83-32-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00717
Acenaphthene	83-32-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00728
Acenaphthene	83-32-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00743
Acenaphthene	83-32-9	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00733
Acenaphthene	83-32-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00722
Acenaphthene	83-32-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00743
Acenaphthene	83-32-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00748
Acenaphthene	83-32-9	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00691
Acenaphthene	83-32-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00743
Acenaphthene	83-32-9	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.006715
Acenaphthylene	208-96-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Acenaphthylene	208-96-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Acenaphthylene	208-96-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Acenaphthylene	208-96-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Acenaphthylene	208-96-8	0.2785	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.02505
Acenaphthylene	208-96-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Acenaphthylene	208-96-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Acenaphthylene	208-96-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Acenaphthylene	208-96-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Acenaphthylene	208-96-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Acenaphthylene	208-96-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Acenaphthylene	208-96-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Acenaphthylene	208-96-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.004835
Acenaphthylene	208-96-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Acenaphthylene	208-96-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Acenaphthylene	208-96-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Acenaphthylene	208-96-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Acenaphthylene	208-96-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Acenaphthylene	208-96-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00495
Acenaphthylene	208-96-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00489
Acenaphthylene	208-96-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00481
Acenaphthylene	208-96-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Acenaphthylene	208-96-8	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00498
Acenaphthylene	208-96-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00461
Acenaphthylene	208-96-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Acenaphthylene	208-96-8	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.004475
Aluminum	7429-90-5	9360	mg/kg	4.61	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		2.3
Aluminum	7429-90-5	9940	mg/kg	4.18		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.09
Aluminum	7429-90-5	12700	mg/kg	4.09		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.05
Aluminum	7429-90-5	10700	mg/kg	4.12		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.06
Aluminum	7429-90-5	7555	mg/kg	3.81		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		1.9
Aluminum	7429-90-5	7650	mg/kg	4.84	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		2.42
Aluminum	7429-90-5	7550	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		28.25

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Aluminum	7429-90-5	12700	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Aluminum	7429-90-5	8310	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4
Aluminum	7429-90-5	8820	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Aluminum	7429-90-5	16600	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Aluminum	7429-90-5	6190	mg/kg	3.97	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.99
Aluminum	7429-90-5	10500	mg/kg	4.54	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		2.27
Aluminum	7429-90-5	12600	mg/kg	25.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		25.3
Aluminum	7429-90-5	8380	mg/kg	3.44	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		1.72
Aluminum	7429-90-5	2770	mg/kg	3.92		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.96
Aluminum	7429-90-5	7125	mg/kg	3.77		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		1.885
Aluminum	7429-90-5	6260	mg/kg	3.91		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		1.96
Aluminum	7429-90-5	6700	mg/kg	3.87	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		1.94
Aluminum	7429-90-5	7640	mg/kg	3.35	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		1.68
Aluminum	7429-90-5	9230	mg/kg	3.31	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		1.65
Aluminum	7429-90-5	13000	mg/kg	3.61	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		1.81
Aluminum	7429-90-5	8980	mg/kg	3.81	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		1.9
Aluminum	7429-90-5	7780	mg/kg	3.65	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		1.82
Aluminum	7429-90-5	8470	mg/kg	3.57		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		1.79
Aluminum	7429-90-5	10200	mg/kg	3.79		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		1.9
Aluminum	7429-90-5	8810	mg/kg	3.76		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		1.88
Aluminum	7429-90-5	8870	mg/kg	3.78	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		1.89
Aluminum	7429-90-5	11700	mg/kg	3.86		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		1.93
Aluminum	7429-90-5	8390	mg/kg	3.62	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		1.81
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Anthracene	120-12-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Anthracene	120-12-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Anthracene	120-12-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Anthracene	120-12-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Anthracene	120-12-7	0.2155	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0451
Anthracene	120-12-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Anthracene	120-12-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Anthracene	120-12-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Anthracene	120-12-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Anthracene	120-12-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Anthracene	120-12-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Anthracene	120-12-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Anthracene	120-12-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0087
Anthracene	120-12-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Anthracene	120-12-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0101
Anthracene	120-12-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Anthracene	120-12-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Anthracene	120-12-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Anthracene	120-12-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00891
Anthracene	120-12-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0088
Anthracene	120-12-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00867
Anthracene	120-12-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Anthracene	120-12-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00897
Anthracene	120-12-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00829
Anthracene	120-12-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Anthracene	120-12-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00805
Antimony	7440-36-0	0.2975	mg/kg	0.595	UJ	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Antimony	7440-36-0	0.347	mg/kg	0.526	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.263
Antimony	7440-36-0	0.352	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Antimony	7440-36-0	0.416	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Antimony	7440-36-0	0.838	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.2375
Antimony	7440-36-0	0.305	mg/kg	0.61	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Antimony	7440-36-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	1.4
Antimony	7440-36-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Antimony	7440-36-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Antimony	7440-36-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Antimony	7440-36-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Antimony	7440-36-0	0.23	mg/kg	0.46	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Antimony	7440-36-0	0.2885	mg/kg	0.577	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Antimony	7440-36-0	0.65	mg/kg	1.3	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	1.3
Antimony	7440-36-0	0.294	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Antimony	7440-36-0	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Antimony	7440-36-0	0.2115	mg/kg	0.423	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4	UU	0.2115
Antimony	7440-36-0	0.2405	mg/kg	0.481	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.241
Antimony	7440-36-0	0.348	mg/kg	0.531	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.265
Antimony	7440-36-0	0.2335	mg/kg	0.467	UJ	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Antimony	7440-36-0	0.258	mg/kg	0.514	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	J	0.257
Antimony	7440-36-0	0.2275	mg/kg	0.455	UJ	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.227
Antimony	7440-36-0	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	U	0.208
Antimony	7440-36-0	0.2315	mg/kg	0.463	UJ	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	U	0.231
Antimony	7440-36-0	0.267	mg/kg	0.509	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	J	0.255
Antimony	7440-36-0	0.304	mg/kg	0.441	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	J	0.221
Antimony	7440-36-0	0.276	mg/kg	0.492	J	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	J	0.246
Antimony	7440-36-0	0.287	mg/kg	0.484	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10	J	0.242
Antimony	7440-36-0	0.26	mg/kg	0.51	J	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	J	0.255
Antimony	7440-36-0	0.2308	mg/kg	0.4615	UJUJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	UU	0.2305
Aroclor 1016	12674-11-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1016	12674-11-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1016	12674-11-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Aroclor 1016	12674-11-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1016	12674-11-2	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1016	12674-11-2	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1016	12674-11-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1016	12674-11-2	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1016	12674-11-2	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1016	12674-11-2	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1221	11104-28-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1221	11104-28-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1221	11104-28-2	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1221	11104-28-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1221	11104-28-2	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1221	11104-28-2	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1221	11104-28-2	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1221	11104-28-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1221	11104-28-2	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1221	11104-28-2	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1221	11104-28-2	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1221	11104-28-2	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1232	11141-16-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1232	11141-16-5	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1232	11141-16-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1232	11141-16-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1232	11141-16-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1232	11141-16-5	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1232	11141-16-5	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1232	11141-16-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1232	11141-16-5	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1232	11141-16-5	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1232	11141-16-5	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1232	11141-16-5	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1242	53469-21-9	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1242	53469-21-9	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1242	53469-21-9	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1242	53469-21-9	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1242	53469-21-9	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1242	53469-21-9	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1242	53469-21-9	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1242	53469-21-9	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1242	53469-21-9	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1242	53469-21-9	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1242	53469-21-9	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1242	53469-21-9	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1248	12672-29-6	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1248	12672-29-6	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1248	12672-29-6	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1248	12672-29-6	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1248	12672-29-6	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1248	12672-29-6	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1248	12672-29-6	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1248	12672-29-6	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1248	12672-29-6	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1248	12672-29-6	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1248	12672-29-6	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1248	12672-29-6	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1254	11097-69-1	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1254	11097-69-1	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	UU	0.04205
Aroclor 1254	11097-69-1	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1254	11097-69-1	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1254	11097-69-1	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1254	11097-69-1	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1254	11097-69-1	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1254	11097-69-1	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1254	11097-69-1	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1254	11097-69-1	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1254	11097-69-1	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1254	11097-69-1	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1260	11096-82-5	0.1025	mg/kg	0.21	JU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	9-Dec-08	0	1	JU	0.04205
Aroclor 1260	11096-82-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1260	11096-82-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1260	11096-82-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1260	11096-82-5	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1260	11096-82-5	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	9-Dec-08	3	4	UU	#DIV/0!
Aroclor 1260	11096-82-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1260	11096-82-5	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1260	11096-82-5	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1260	11096-82-5	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Arsenic	7440-38-2	9.14	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.595
Arsenic	7440-38-2	13.2	mg/kg	1.05		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.526
Arsenic	7440-38-2	11.7	mg/kg	1.06		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.531
Arsenic	7440-38-2	9.06	mg/kg	1.1		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.551
Arsenic	7440-38-2	10.95	mg/kg	0.9515		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.476
Arsenic	7440-38-2	12.6	mg/kg	1.22	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.61
Arsenic	7440-38-2	8.1	mg/kg	1.4		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		1.4
Arsenic	7440-38-2	19.6	mg/kg	2.6		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		2.6
Arsenic	7440-38-2	9.4	mg/kg	1.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		1.7
Arsenic	7440-38-2	14	mg/kg	1.3		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.3
Arsenic	7440-38-2	31.2	mg/kg	2.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		2.4
Arsenic	7440-38-2	6.7	mg/kg	0.919	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.46
Arsenic	7440-38-2	6.4	mg/kg	1.15	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.577
Arsenic	7440-38-2	15.8	mg/kg	1.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		1.3
Arsenic	7440-38-2	6.17	mg/kg	0.957	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.479
Arsenic	7440-38-2	5.62	mg/kg	0.898		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.449
Arsenic	7440-38-2	3.57	mg/kg	0.8455		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.423
Arsenic	7440-38-2	11.6	mg/kg	0.962		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.481
Arsenic	7440-38-2	9.98	mg/kg	1.06	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.531
Arsenic	7440-38-2	5.13	mg/kg	0.933	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.467
Arsenic	7440-38-2	8.3	mg/kg	1.03	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.514
Arsenic	7440-38-2	7.53	mg/kg	0.909	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.455
Arsenic	7440-38-2	4.54	mg/kg	0.831	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.415
Arsenic	7440-38-2	4.3	mg/kg	0.925	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.463
Arsenic	7440-38-2	6.7	mg/kg	1.02		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.509
Arsenic	7440-38-2	8.59	mg/kg	0.883		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.441
Arsenic	7440-38-2	5.78	mg/kg	0.984		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.492
Arsenic	7440-38-2	10.4	mg/kg	0.968	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.484
Arsenic	7440-38-2	5.65	mg/kg	1.02		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.51
Arsenic	7440-38-2	9.555	mg/kg	0.9225	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.4615
Barium	7440-39-3	83.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Barium	7440-39-3	107	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Barium	7440-39-3	105	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Barium	7440-39-3	82.7	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Barium	7440-39-3	84.4	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Barium	7440-39-3	84.9	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Barium	7440-39-3	43	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		28.25
Barium	7440-39-3	163	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Barium	7440-39-3	41.3	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Barium	7440-39-3	160	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Barium	7440-39-3	132	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Barium	7440-39-3	32.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Barium	7440-39-3	62.6	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Barium	7440-39-3	78.9	mg/kg	25.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		25.3
Barium	7440-39-3	35.9	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Barium	7440-39-3	13	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Barium	7440-39-3	92.4	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.09425
Barium	7440-39-3	168	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Barium	7440-39-3	109	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Barium	7440-39-3	39	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Barium	7440-39-3	37.7	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Barium	7440-39-3	73.6	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Barium	7440-39-3	51.5	mg/kg	0.19	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.0951
Barium	7440-39-3	56.1	mg/kg	0.182	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.0911
Barium	7440-39-3	46.7	mg/kg	0.179		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.0893
Barium	7440-39-3	451	mg/kg	0.19		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.0948
Barium	7440-39-3	45.5	mg/kg	0.188		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.094
Barium	7440-39-3	32.6	mg/kg	0.189	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.0944
Barium	7440-39-3	42.3	mg/kg	0.193		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.0965
Barium	7440-39-3	39.35	mg/kg	0.181	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.0905
Benzo(a)anthracene	56-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)anthracene	56-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)anthracene	56-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)anthracene	56-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)anthracene	56-55-3	0.8555	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.137
Benzo(a)anthracene	56-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)anthracene	56-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(a)anthracene	56-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)anthracene	56-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)anthracene	56-55-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(a)anthracene	56-55-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0275
Benzo(a)anthracene	56-55-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0254
Benzo(a)anthracene	56-55-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.02645
Benzo(a)anthracene	56-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0264
Benzo(a)anthracene	56-55-3	0.0642	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0308
Benzo(a)anthracene	56-55-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0265
Benzo(a)anthracene	56-55-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0262
Benzo(a)anthracene	56-55-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0266
Benzo(a)anthracene	56-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0271
Benzo(a)anthracene	56-55-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0268
Benzo(a)anthracene	56-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0264
Benzo(a)anthracene	56-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0271
Benzo(a)anthracene	56-55-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0273
Benzo(a)anthracene	56-55-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0252
Benzo(a)anthracene	56-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0271
Benzo(a)anthracene	56-55-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0245
Benzo(a)pyrene	50-32-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)pyrene	50-32-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)pyrene	50-32-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)pyrene	50-32-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)pyrene	50-32-8	0.721	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.137
Benzo(a)pyrene	50-32-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)pyrene	50-32-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(a)pyrene	50-32-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)pyrene	50-32-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)pyrene	50-32-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(a)pyrene	50-32-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0275
Benzo(a)pyrene	50-32-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0254

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Benzo(a)pyrene	50-32-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.02645
Benzo(a)pyrene	50-32-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0264
Benzo(a)pyrene	50-32-8	0.0534	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0308
Benzo(a)pyrene	50-32-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0265
Benzo(a)pyrene	50-32-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0262
Benzo(a)pyrene	50-32-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0266
Benzo(a)pyrene	50-32-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0271
Benzo(a)pyrene	50-32-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0268
Benzo(a)pyrene	50-32-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0264
Benzo(a)pyrene	50-32-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0271
Benzo(a)pyrene	50-32-8	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0273
Benzo(a)pyrene	50-32-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0252
Benzo(a)pyrene	50-32-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0271
Benzo(a)pyrene	50-32-8	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0245
Benzo(b)fluoranthene	205-99-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0816
Benzo(b)fluoranthene	205-99-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0808
Benzo(b)fluoranthene	205-99-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0764
Benzo(b)fluoranthene	205-99-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.395
Benzo(b)fluoranthene	205-99-2	1.205	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.3475
Benzo(b)fluoranthene	205-99-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0894
Benzo(b)fluoranthene	205-99-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(b)fluoranthene	205-99-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0684
Benzo(b)fluoranthene	205-99-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0746
Benzo(b)fluoranthene	205-99-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0663
Benzo(b)fluoranthene	205-99-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0687
Benzo(b)fluoranthene	205-99-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0698
Benzo(b)fluoranthene	205-99-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0678
Benzo(b)fluoranthene	205-99-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0644
Benzo(b)fluoranthene	205-99-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0668
Benzo(b)fluoranthene	205-99-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.06705
Benzo(b)fluoranthene	205-99-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0687
Benzo(b)fluoranthene	205-99-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0668
Benzo(b)fluoranthene	205-99-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0691
Benzo(b)fluoranthene	205-99-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0674
Benzo(b)fluoranthene	205-99-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0639
Benzo(b)fluoranthene	205-99-2	0.0829	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.078
Benzo(b)fluoranthene	205-99-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0687
Benzo(b)fluoranthene	205-99-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0672
Benzo(b)fluoranthene	205-99-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0621
Benzo(b)fluoranthene	205-99-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(ghi)perylene	191-24-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzo(ghi)perylene	191-24-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzo(ghi)perylene	191-24-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzo(ghi)perylene	191-24-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzo(ghi)perylene	191-24-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzo(ghi)perylene	191-24-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzo(ghi)perylene	191-24-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(ghi)perylene	191-24-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzo(ghi)perylene	191-24-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzo(ghi)perylene	191-24-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(ghi)perylene	191-24-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzo(ghi)perylene	191-24-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzo(ghi)perylene	191-24-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.09815
Benzo(ghi)perylene	191-24-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzo(ghi)perylene	191-24-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzo(ghi)perylene	191-24-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Benzo(ghi)perylene	191-24-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzo(ghi)perylene	191-24-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzo(ghi)perylene	191-24-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.101

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Benzo(ghi)perylene	191-24-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0992
Benzo(ghi)perylene	191-24-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0977
Benzo(ghi)perylene	191-24-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.101
Benzo(ghi)perylene	191-24-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.101
Benzo(ghi)perylene	191-24-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0935
Benzo(ghi)perylene	191-24-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.1
Benzo(ghi)perylene	191-24-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.09085
Benzo(k)fluoranthene	207-08-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.148
Benzo(k)fluoranthene	207-08-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Benzo(k)fluoranthene	207-08-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.139
Benzo(k)fluoranthene	207-08-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.719
Benzo(k)fluoranthene	207-08-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.633
Benzo(k)fluoranthene	207-08-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.163
Benzo(k)fluoranthene	207-08-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(k)fluoranthene	207-08-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.124
Benzo(k)fluoranthene	207-08-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.136
Benzo(k)fluoranthene	207-08-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(k)fluoranthene	207-08-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.127
Benzo(k)fluoranthene	207-08-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.117
Benzo(k)fluoranthene	207-08-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.122
Benzo(k)fluoranthene	207-08-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.122
Benzo(k)fluoranthene	207-08-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.142
Benzo(k)fluoranthene	207-08-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.122
Benzo(k)fluoranthene	207-08-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.121
Benzo(k)fluoranthene	207-08-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.123
Benzo(k)fluoranthene	207-08-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.125
Benzo(k)fluoranthene	207-08-9	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.123
Benzo(k)fluoranthene	207-08-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.122
Benzo(k)fluoranthene	207-08-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.125
Benzo(k)fluoranthene	207-08-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.126
Benzo(k)fluoranthene	207-08-9	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.116
Benzo(k)fluoranthene	207-08-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.125
Benzo(k)fluoranthene	207-08-9	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.113
Benzoic acid	65-85-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzoic acid	65-85-0	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzoic acid	65-85-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzoic acid	65-85-0	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzoic acid	65-85-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzoic acid	65-85-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzoic acid	65-85-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzoic acid	65-85-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzoic acid	65-85-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzoic acid	65-85-0	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzoic acid	65-85-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.09815
Benzoic acid	65-85-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzoic acid	65-85-0	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzoic acid	65-85-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Benzoic acid	65-85-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzoic acid	65-85-0	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzoic acid	65-85-0	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.101
Benzoic acid	65-85-0	0.2035	mg/kg	0.407	UJ	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0992
Benzoic acid	65-85-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0977
Benzoic acid	65-85-0	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.101
Benzoic acid	65-85-0	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.101
Benzoic acid	65-85-0	0.192	mg/kg	0.384	UJ	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0935
Benzoic acid	65-85-0	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.1
Benzoic acid	65-85-0	0.1863	mg/kg	0.3725	UJUJ	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.09085
Benzyl alcohol	100-51-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzyl alcohol	100-51-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzyl alcohol	100-51-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzyl alcohol	100-51-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzyl alcohol	100-51-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.509
Benzyl alcohol	100-51-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Benzyl alcohol	100-51-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzyl alcohol	100-51-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzyl alcohol	100-51-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzyl alcohol	100-51-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzyl alcohol	100-51-6	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.09815
Benzyl alcohol	100-51-6	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzyl alcohol	100-51-6	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzyl alcohol	100-51-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Benzyl alcohol	100-51-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzyl alcohol	100-51-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzyl alcohol	100-51-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.101
Benzyl alcohol	100-51-6	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0992
Benzyl alcohol	100-51-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0977
Benzyl alcohol	100-51-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.101
Benzyl alcohol	100-51-6	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.101
Benzyl alcohol	100-51-6	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0935
Benzyl alcohol	100-51-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.1
Benzyl alcohol	100-51-6	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.09085
Beryllium	7440-41-7	10.8	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Beryllium	7440-41-7	13.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Beryllium	7440-41-7	16.5	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Beryllium	7440-41-7	13.6	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Beryllium	7440-41-7	11.1	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Beryllium	7440-41-7	8.94	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Beryllium	7440-41-7	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.71
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	1.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Beryllium	7440-41-7	5.74	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Beryllium	7440-41-7	11.5	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Beryllium	7440-41-7	4.87	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Beryllium	7440-41-7	5.82	mg/kg	0.19	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.0951
Beryllium	7440-41-7	5.99	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Beryllium	7440-41-7	5.23	mg/kg	0.182	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.0911
Beryllium	7440-41-7	3.62	mg/kg	0.196	J	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Beryllium	7440-41-7	5.49	mg/kg	0.179	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.0893
Beryllium	7440-41-7	7.305	mg/kg	0.1885	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.09425
Beryllium	7440-41-7	8.48	mg/kg	0.19	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.0948
Beryllium	7440-41-7	12.9	mg/kg	0.196	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Beryllium	7440-41-7	7	mg/kg	0.188	J	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.094
Beryllium	7440-41-7	6.55	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Beryllium	7440-41-7	6.71	mg/kg	0.189	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.0944
Beryllium	7440-41-7	11.5	mg/kg	0.194	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Beryllium	7440-41-7	7.18	mg/kg	0.193	J	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.0965
Beryllium	7440-41-7	5.85	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Beryllium	7440-41-7	6.905	mg/kg	0.181	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.0905
Beryllium	7440-41-7	0.315	mg/kg	0.63	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.63
Bis(2-chloroethoxy)methane	111-91-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0103
Bis(2-chloroethoxy)methane	111-91-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0102
Bis(2-chloroethoxy)methane	111-91-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00963
Bis(2-chloroethoxy)methane	111-91-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0498
Bis(2-chloroethoxy)methane	111-91-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.04385
Bis(2-chloroethoxy)methane	111-91-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Bis(2-chloroethoxy)methane	111-91-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroethoxy)methane	111-91-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00863
Bis(2-chloroethoxy)methane	111-91-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00941
Bis(2-chloroethoxy)methane	111-91-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroethoxy)methane	111-91-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00881
Bis(2-chloroethoxy)methane	111-91-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00812
Bis(2-chloroethoxy)methane	111-91-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00846
Bis(2-chloroethoxy)methane	111-91-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00843
Bis(2-chloroethoxy)methane	111-91-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00984

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Bis(2-chloroethoxy)methane	111-91-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00848
Bis(2-chloroethoxy)methane	111-91-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00837
Bis(2-chloroethoxy)methane	111-91-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0085
Bis(2-chloroethoxy)methane	111-91-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00867
Bis(2-chloroethoxy)methane	111-91-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00856
Bis(2-chloroethoxy)methane	111-91-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00843
Bis(2-chloroethoxy)methane	111-91-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00866
Bis(2-chloroethoxy)methane	111-91-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00872
Bis(2-chloroethoxy)methane	111-91-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00806
Bis(2-chloroethoxy)methane	111-91-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00866
Bis(2-chloroethoxy)methane	111-91-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00783
Bis(2-chloroethyl)ether	111-44-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0125
Bis(2-chloroethyl)ether	111-44-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0124
Bis(2-chloroethyl)ether	111-44-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0117
Bis(2-chloroethyl)ether	111-44-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0605
Bis(2-chloroethyl)ether	111-44-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.05325
Bis(2-chloroethyl)ether	111-44-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0137
Bis(2-chloroethyl)ether	111-44-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroethyl)ether	111-44-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0114
Bis(2-chloroethyl)ether	111-44-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroethyl)ether	111-44-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0107
Bis(2-chloroethyl)ether	111-44-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00986
Bis(2-chloroethyl)ether	111-44-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0103
Bis(2-chloroethyl)ether	111-44-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0102
Bis(2-chloroethyl)ether	111-44-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0119
Bis(2-chloroethyl)ether	111-44-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0103
Bis(2-chloroethyl)ether	111-44-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0102
Bis(2-chloroethyl)ether	111-44-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0103
Bis(2-chloroethyl)ether	111-44-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0104
Bis(2-chloroethyl)ether	111-44-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0102
Bis(2-chloroethyl)ether	111-44-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0106
Bis(2-chloroethyl)ether	111-44-4	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00979
Bis(2-chloroethyl)ether	111-44-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00951
Bis(2-chloroisopropyl)ether	108-60-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Bis(2-chloroisopropyl)ether	108-60-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0211
Bis(2-chloroisopropyl)ether	108-60-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.02
Bis(2-chloroisopropyl)ether	108-60-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Bis(2-chloroisopropyl)ether	108-60-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0909
Bis(2-chloroisopropyl)ether	108-60-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0234
Bis(2-chloroisopropyl)ether	108-60-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroisopropyl)ether	108-60-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0179
Bis(2-chloroisopropyl)ether	108-60-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0195
Bis(2-chloroisopropyl)ether	108-60-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroisopropyl)ether	108-60-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0182
Bis(2-chloroisopropyl)ether	108-60-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0168
Bis(2-chloroisopropyl)ether	108-60-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0175
Bis(2-chloroisopropyl)ether	108-60-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0175
Bis(2-chloroisopropyl)ether	108-60-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0204
Bis(2-chloroisopropyl)ether	108-60-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0176
Bis(2-chloroisopropyl)ether	108-60-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0173
Bis(2-chloroisopropyl)ether	108-60-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0176
Bis(2-chloroisopropyl)ether	108-60-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.018
Bis(2-chloroisopropyl)ether	108-60-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0177
Bis(2-chloroisopropyl)ether	108-60-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0175
Bis(2-chloroisopropyl)ether	108-60-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0179

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Bis(2-chloroisopropyl)ether	108-60-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0181
Bis(2-chloroisopropyl)ether	108-60-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0167
Bis(2-chloroisopropyl)ether	108-60-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0179
Bis(2-chloroisopropyl)ether	108-60-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0162
Bis(2-ethylhexyl)phthalate	117-81-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0453
Bis(2-ethylhexyl)phthalate	117-81-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0448
Bis(2-ethylhexyl)phthalate	117-81-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0424
Bis(2-ethylhexyl)phthalate	117-81-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.219
Bis(2-ethylhexyl)phthalate	117-81-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.193
Bis(2-ethylhexyl)phthalate	117-81-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0496
Bis(2-ethylhexyl)phthalate	117-81-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-ethylhexyl)phthalate	117-81-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.038
Bis(2-ethylhexyl)phthalate	117-81-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0414
Bis(2-ethylhexyl)phthalate	117-81-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-ethylhexyl)phthalate	117-81-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0387
Bis(2-ethylhexyl)phthalate	117-81-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0357
Bis(2-ethylhexyl)phthalate	117-81-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.03725
Bis(2-ethylhexyl)phthalate	117-81-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0371
Bis(2-ethylhexyl)phthalate	117-81-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0433
Bis(2-ethylhexyl)phthalate	117-81-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0373
Bis(2-ethylhexyl)phthalate	117-81-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0368
Bis(2-ethylhexyl)phthalate	117-81-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0374
Bis(2-ethylhexyl)phthalate	117-81-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0381
Bis(2-ethylhexyl)phthalate	117-81-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0376
Bis(2-ethylhexyl)phthalate	117-81-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0371
Bis(2-ethylhexyl)phthalate	117-81-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0381
Bis(2-ethylhexyl)phthalate	117-81-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0384
Bis(2-ethylhexyl)phthalate	117-81-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0355
Bis(2-ethylhexyl)phthalate	117-81-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0381
Bis(2-ethylhexyl)phthalate	117-81-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.03445
Bromophenyl phenyl ether, 4-	101-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Bromophenyl phenyl ether, 4-	101-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Bromophenyl phenyl ether, 4-	101-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Bromophenyl phenyl ether, 4-	101-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Bromophenyl phenyl ether, 4-	101-55-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
Bromophenyl phenyl ether, 4-	101-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Bromophenyl phenyl ether, 4-	101-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bromophenyl phenyl ether, 4-	101-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Bromophenyl phenyl ether, 4-	101-55-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bromophenyl phenyl ether, 4-	101-55-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
Bromophenyl phenyl ether, 4-	101-55-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
Bromophenyl phenyl ether, 4-	101-55-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
Bromophenyl phenyl ether, 4-	101-55-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Bromophenyl phenyl ether, 4-	101-55-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
Bromophenyl phenyl ether, 4-	101-55-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0145
Bromophenyl phenyl ether, 4-	101-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0143
Bromophenyl phenyl ether, 4-	101-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0148
Bromophenyl phenyl ether, 4-	101-55-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0137
Bromophenyl phenyl ether, 4-	101-55-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0133
Butyl benzyl phthalate	85-68-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Butyl benzyl phthalate	85-68-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Butyl benzyl phthalate	85-68-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Butyl benzyl phthalate	85-68-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Butyl benzyl phthalate	85-68-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08465
Butyl benzyl phthalate	85-68-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217
Butyl benzyl phthalate	85-68-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Butyl benzyl phthalate	85-68-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Butyl benzyl phthalate	85-68-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Butyl benzyl phthalate	85-68-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Butyl benzyl phthalate	85-68-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.017
Butyl benzyl phthalate	85-68-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0157
Butyl benzyl phthalate	85-68-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0163
Butyl benzyl phthalate	85-68-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0163
Butyl benzyl phthalate	85-68-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.019
Butyl benzyl phthalate	85-68-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0164
Butyl benzyl phthalate	85-68-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0161
Butyl benzyl phthalate	85-68-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0164
Butyl benzyl phthalate	85-68-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0167
Butyl benzyl phthalate	85-68-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0165
Butyl benzyl phthalate	85-68-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0163
Butyl benzyl phthalate	85-68-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0167
Butyl benzyl phthalate	85-68-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0168
Butyl benzyl phthalate	85-68-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0155
Butyl benzyl phthalate	85-68-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0167
Butyl benzyl phthalate	85-68-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0151
Cadmium	7440-43-9	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Cadmium	7440-43-9	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Cadmium	7440-43-9	0.263	mg/kg	0.526	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.263
Cadmium	7440-43-9	0.2655	mg/kg	0.531	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.266
Cadmium	7440-43-9	0.2755	mg/kg	0.551	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.276
Cadmium	7440-43-9	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Cadmium	7440-43-9	0.2603	mg/kg	0.476	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JU	0.2375
Cadmium	7440-43-9	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Cadmium	7440-43-9	0.14	mg/kg	0.28	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.28
Cadmium	7440-43-9	0.26	mg/kg	0.52	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	0.52
Cadmium	7440-43-9	0.165	mg/kg	0.33	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.33
Cadmium	7440-43-9	0.13	mg/kg	0.26	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.26
Cadmium	7440-43-9	0.245	mg/kg	0.49	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.49
Cadmium	7440-43-9	0.125	mg/kg	0.25	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.25
Cadmium	7440-43-9	0.345	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Cadmium	7440-43-9	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Cadmium	7440-43-9	0.2815	mg/kg	0.423	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4	JJ	0.2115
Cadmium	7440-43-9	0.269	mg/kg	0.481	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	J	0.241
Cadmium	7440-43-9	0.2655	mg/kg	0.531	U	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.265
Cadmium	7440-43-9	0.2335	mg/kg	0.467	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Cadmium	7440-43-9	0.257	mg/kg	0.514	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.257
Cadmium	7440-43-9	0.2275	mg/kg	0.455	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.227
Cadmium	7440-43-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	U	0.208
Cadmium	7440-43-9	0.2315	mg/kg	0.463	U	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	U	0.231
Cadmium	7440-43-9	0.277	mg/kg	0.509	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	J	0.255
Cadmium	7440-43-9	0.276	mg/kg	0.441	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	J	0.221
Cadmium	7440-43-9	0.246	mg/kg	0.492	U	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	U	0.246
Cadmium	7440-43-9	7.66	mg/kg	0.484		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.242
Cadmium	7440-43-9	0.255	mg/kg	0.51	U	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	U	0.255
Cadmium	7440-43-9	0.2308	mg/kg	0.4615	UU	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	UU	0.2305
Calcium	7440-70-2	18800	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76
Calcium	7440-70-2	9390	mg/kg	5.23		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.61
Calcium	7440-70-2	3330	mg/kg	5.11		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.56
Calcium	7440-70-2	35100	mg/kg	5.16		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.58
Calcium	7440-70-2	12400	mg/kg	4.76		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		2.38
Calcium	7440-70-2	15600	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Calcium	7440-70-2	3840	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Calcium	7440-70-2	6600	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Calcium	7440-70-2	5590	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Calcium	7440-70-2	6080	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Calcium	7440-70-2	59100	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Calcium	7440-70-2	14400	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Calcium	7440-70-2	4580	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Calcium	7440-70-2	3770	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Calcium	7440-70-2	46600	mg/kg	8.61		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		4.31
Calcium	7440-70-2	26700	mg/kg	4.9		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		2.45
Calcium	7440-70-2	2680	mg/kg	4.715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		2.355
Calcium	7440-70-2	2960	mg/kg	4.89		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		2.44
Calcium	7440-70-2	5380	mg/kg	4.84	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		2.42
Calcium	7440-70-2	46200	mg/kg	8.38		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		4.19
Calcium	7440-70-2	35200	mg/kg	8.26		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		4.13
Calcium	7440-70-2	37800	mg/kg	9.03		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		4.51
Calcium	7440-70-2	50900	mg/kg	9.51		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		4.76
Calcium	7440-70-2	45700	mg/kg	9.11		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		4.56
Calcium	7440-70-2	48600	mg/kg	4.46		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		2.23
Calcium	7440-70-2	2300	mg/kg	4.74		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		2.37
Calcium	7440-70-2	36000	mg/kg	4.7		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		2.35
Calcium	7440-70-2	39300	mg/kg	9.44		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		4.72
Calcium	7440-70-2	40400	mg/kg	4.82		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		2.41
Calcium	7440-70-2	38750	mg/kg	9.05		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		4.525
Carbazole	86-74-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.049
Carbazole	86-74-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0485
Carbazole	86-74-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0458
Carbazole	86-74-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.237
Carbazole	86-74-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2085
Carbazole	86-74-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0536
Carbazole	86-74-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Carbazole	86-74-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.041
Carbazole	86-74-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0448
Carbazole	86-74-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Carbazole	86-74-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0419
Carbazole	86-74-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0386
Carbazole	86-74-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.04025
Carbazole	86-74-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0401
Carbazole	86-74-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0468
Carbazole	86-74-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0403
Carbazole	86-74-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0398
Carbazole	86-74-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0404
Carbazole	86-74-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0412
Carbazole	86-74-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0407
Carbazole	86-74-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0401
Carbazole	86-74-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0412
Carbazole	86-74-8	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0415
Carbazole	86-74-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0384
Carbazole	86-74-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0412
Carbazole	86-74-8	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.03725
Chloro-3-methylphenol, 4-	59-50-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Chloro-3-methylphenol, 4-	59-50-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Chloro-3-methylphenol, 4-	59-50-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Chloro-3-methylphenol, 4-	59-50-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584
Chloro-3-methylphenol, 4-	59-50-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0514
Chloro-3-methylphenol, 4-	59-50-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132
Chloro-3-methylphenol, 4-	59-50-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloro-3-methylphenol, 4-	59-50-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Chloro-3-methylphenol, 4-	59-50-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Chloro-3-methylphenol, 4-	59-50-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloro-3-methylphenol, 4-	59-50-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0103
Chloro-3-methylphenol, 4-	59-50-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00952
Chloro-3-methylphenol, 4-	59-50-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00991

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Chloro-3-methylphenol, 4-	59-50-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00987
Chloro-3-methylphenol, 4-	59-50-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0115
Chloro-3-methylphenol, 4-	59-50-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00993
Chloro-3-methylphenol, 4-	59-50-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0098
Chloro-3-methylphenol, 4-	59-50-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00995
Chloro-3-methylphenol, 4-	59-50-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0102
Chloro-3-methylphenol, 4-	59-50-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.01
Chloro-3-methylphenol, 4-	59-50-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00987
Chloro-3-methylphenol, 4-	59-50-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0101
Chloro-3-methylphenol, 4-	59-50-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0102
Chloro-3-methylphenol, 4-	59-50-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00944
Chloro-3-methylphenol, 4-	59-50-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0101
Chloro-3-methylphenol, 4-	59-50-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.009175
Chloroaniline, 4-	106-47-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0425
Chloroaniline, 4-	106-47-8	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0421
Chloroaniline, 4-	106-47-8	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0398
Chloroaniline, 4-	106-47-8	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.206
Chloroaniline, 4-	106-47-8	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.181
Chloroaniline, 4-	106-47-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Chloroaniline, 4-	106-47-8	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloroaniline, 4-	106-47-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0356
Chloroaniline, 4-	106-47-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0389
Chloroaniline, 4-	106-47-8	0.21	mg/kg	0.42	UJ	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloroaniline, 4-	106-47-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0364
Chloroaniline, 4-	106-47-8	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0335
Chloroaniline, 4-	106-47-8	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.03495
Chloroaniline, 4-	106-47-8	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0348
Chloroaniline, 4-	106-47-8	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0406
Chloroaniline, 4-	106-47-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.035
Chloroaniline, 4-	106-47-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0345
Chloroaniline, 4-	106-47-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0351
Chloroaniline, 4-	106-47-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0358
Chloroaniline, 4-	106-47-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0353
Chloroaniline, 4-	106-47-8	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0348
Chloroaniline, 4-	106-47-8	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0358
Chloroaniline, 4-	106-47-8	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.036
Chloroaniline, 4-	106-47-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0333
Chloroaniline, 4-	106-47-8	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0358
Chloroaniline, 4-	106-47-8	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0323
Chloronaphthalene, 2-	91-58-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00779
Chloronaphthalene, 2-	91-58-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Chloronaphthalene, 2-	91-58-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00729
Chloronaphthalene, 2-	91-58-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0377
Chloronaphthalene, 2-	91-58-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0332
Chloronaphthalene, 2-	91-58-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00854
Chloronaphthalene, 2-	91-58-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloronaphthalene, 2-	91-58-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00653
Chloronaphthalene, 2-	91-58-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00712
Chloronaphthalene, 2-	91-58-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloronaphthalene, 2-	91-58-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00667
Chloronaphthalene, 2-	91-58-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00615
Chloronaphthalene, 2-	91-58-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.006405
Chloronaphthalene, 2-	91-58-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00638
Chloronaphthalene, 2-	91-58-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00745
Chloronaphthalene, 2-	91-58-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00642
Chloronaphthalene, 2-	91-58-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00633
Chloronaphthalene, 2-	91-58-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00643
Chloronaphthalene, 2-	91-58-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00656
Chloronaphthalene, 2-	91-58-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00648

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Chloronaphthalene, 2-	91-58-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00638
Chloronaphthalene, 2-	91-58-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00656
Chloronaphthalene, 2-	91-58-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0066
Chloronaphthalene, 2-	91-58-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0061
Chloronaphthalene, 2-	91-58-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00656
Chloronaphthalene, 2-	91-58-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.005925
Chlorophenol, 2-	95-57-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00603
Chlorophenol, 2-	95-57-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00597
Chlorophenol, 2-	95-57-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00564
Chlorophenol, 2-	95-57-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0292
Chlorophenol, 2-	95-57-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0257
Chlorophenol, 2-	95-57-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0066
Chlorophenol, 2-	95-57-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenol, 2-	95-57-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00505
Chlorophenol, 2-	95-57-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00551
Chlorophenol, 2-	95-57-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chlorophenol, 2-	95-57-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00516
Chlorophenol, 2-	95-57-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00476
Chlorophenol, 2-	95-57-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.004955
Chlorophenol, 2-	95-57-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00494
Chlorophenol, 2-	95-57-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00576
Chlorophenol, 2-	95-57-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00497
Chlorophenol, 2-	95-57-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0049
Chlorophenol, 2-	95-57-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00498
Chlorophenol, 2-	95-57-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00508
Chlorophenol, 2-	95-57-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00501
Chlorophenol, 2-	95-57-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00494
Chlorophenol, 2-	95-57-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00507
Chlorophenol, 2-	95-57-8	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00511
Chlorophenol, 2-	95-57-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00472
Chlorophenol, 2-	95-57-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00507
Chlorophenol, 2-	95-57-8	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.004585
Chlorophenyl phenyl ether, 4-	7005-72-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0375
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0371
Chlorophenyl phenyl ether, 4-	7005-72-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0351
Chlorophenyl phenyl ether, 4-	7005-72-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.182
Chlorophenyl phenyl ether, 4-	7005-72-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1595
Chlorophenyl phenyl ether, 4-	7005-72-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0411
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenyl phenyl ether, 4-	7005-72-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0314
Chlorophenyl phenyl ether, 4-	7005-72-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0343
Chlorophenyl phenyl ether, 4-	7005-72-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0321
Chlorophenyl phenyl ether, 4-	7005-72-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0296
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0308
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0307
Chlorophenyl phenyl ether, 4-	7005-72-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0358
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0309
Chlorophenyl phenyl ether, 4-	7005-72-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0305
Chlorophenyl phenyl ether, 4-	7005-72-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0309
Chlorophenyl phenyl ether, 4-	7005-72-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0316
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0312
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0307
Chlorophenyl phenyl ether, 4-	7005-72-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0316
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0318
Chlorophenyl phenyl ether, 4-	7005-72-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0294
Chlorophenyl phenyl ether, 4-	7005-72-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0316
Chlorophenyl phenyl ether, 4-	7005-72-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.02855
Chromium	7440-47-3	12.4	mg/kg	0.576		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Chromium	7440-47-3	13.6	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Chromium	7440-47-3	12	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Chromium	7440-47-3	16.4	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Chromium	7440-47-3	13	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.238
Chromium	7440-47-3	10.7	mg/kg	0.605		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Chromium	7440-47-3	13.2	mg/kg	0.71		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		0.71
Chromium	7440-47-3	12.2	mg/kg	1.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		1.3
Chromium	7440-47-3	18.1	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Chromium	7440-47-3	10.5	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Chromium	7440-47-3	13.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Chromium	7440-47-3	10.6	mg/kg	0.496		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Chromium	7440-47-3	14.6	mg/kg	0.567		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Chromium	7440-47-3	20.7	mg/kg	0.63		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.63
Chromium	7440-47-3	11.9	mg/kg	0.431		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.215
Chromium	7440-47-3	5.51	mg/kg	0.49		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.245
Chromium	7440-47-3	11.6	mg/kg	0.4715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.2355
Chromium	7440-47-3	13.5	mg/kg	0.489		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.244
Chromium	7440-47-3	8.34	mg/kg	0.484		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.242
Chromium	7440-47-3	11.7	mg/kg	0.419		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.209
Chromium	7440-47-3	13.9	mg/kg	0.413		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.207
Chromium	7440-47-3	19.5	mg/kg	0.451		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.226
Chromium	7440-47-3	13.4	mg/kg	0.476		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.238
Chromium	7440-47-3	11.5	mg/kg	0.456		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.228
Chromium	7440-47-3	11.7	mg/kg	0.446		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.223
Chromium	7440-47-3	17.7	mg/kg	0.474		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.237
Chromium	7440-47-3	13.7	mg/kg	0.47		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.235
Chromium	7440-47-3	13.4	mg/kg	0.472		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.236
Chromium	7440-47-3	17	mg/kg	0.482		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.241
Chromium	7440-47-3	12.75	mg/kg	0.4525		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.2265
Chrysene	218-01-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0194
Chrysene	218-01-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0192
Chrysene	218-01-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0182
Chrysene	218-01-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.094
Chrysene	218-01-9	0.85	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0827
Chrysene	218-01-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Chrysene	218-01-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chrysene	218-01-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0163
Chrysene	218-01-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0177
Chrysene	218-01-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chrysene	218-01-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0166
Chrysene	218-01-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0153
Chrysene	218-01-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.01595
Chrysene	218-01-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0159
Chrysene	218-01-9	0.0675	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0186
Chrysene	218-01-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.016
Chrysene	218-01-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0158
Chrysene	218-01-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.016
Chrysene	218-01-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0163
Chrysene	218-01-9	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0161
Chrysene	218-01-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0159
Chrysene	218-01-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0163
Chrysene	218-01-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0164
Chrysene	218-01-9	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0152
Chrysene	218-01-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0163
Chrysene	218-01-9	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0148
Cobalt	7440-48-4	8.57	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Cobalt	7440-48-4	9.92	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Cobalt	7440-48-4	8.92	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Cobalt	7440-48-4	8.36	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Cobalt	7440-48-4	6.715	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Cobalt	7440-48-4	6.2	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Cobalt	7440-48-4	5.75	mg/kg	7.1	/U	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	U	7.1
Cobalt	7440-48-4	6.8	mg/kg	6.5		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		6.5

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Cobalt	7440-48-4	4.2	mg/kg	8.4	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	8.4
Cobalt	7440-48-4	8.6	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Cobalt	7440-48-4	26	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Cobalt	7440-48-4	5.47	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Cobalt	7440-48-4	10.1	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Cobalt	7440-48-4	14.8	mg/kg	6.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		6.3
Cobalt	7440-48-4	9.76	mg/kg	0.172		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Cobalt	7440-48-4	3.23	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Cobalt	7440-48-4	27.85	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.09425
Cobalt	7440-48-4	20.5	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Cobalt	7440-48-4	5.37	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Cobalt	7440-48-4	8.95	mg/kg	0.168		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Cobalt	7440-48-4	6.18	mg/kg	0.165		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Cobalt	7440-48-4	10.1	mg/kg	0.181		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Cobalt	7440-48-4	9.22	mg/kg	0.19		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.0951
Cobalt	7440-48-4	8.14	mg/kg	0.182		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.0911
Cobalt	7440-48-4	8.43	mg/kg	0.179		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.0893
Cobalt	7440-48-4	62.2	mg/kg	0.19		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.0948
Cobalt	7440-48-4	10.3	mg/kg	0.188		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.094
Cobalt	7440-48-4	11.2	mg/kg	0.189		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.0944
Cobalt	7440-48-4	10.1	mg/kg	0.193		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.0965
Cobalt	7440-48-4	10.5	mg/kg	0.181		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.0905
Copper	7440-50-8	27.3	mg/kg	0.576	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288
Copper	7440-50-8	30.5	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Copper	7440-50-8	50	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Copper	7440-50-8	47.9	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Copper	7440-50-8	31.9	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.238
Copper	7440-50-8	18.2	mg/kg	0.605	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Copper	7440-50-8	15.25	mg/kg	3.55		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		3.55
Copper	7440-50-8	32.1	mg/kg	3.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.3
Copper	7440-50-8	13.5	mg/kg	4.2		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		4.2
Copper	7440-50-8	24	mg/kg	3.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		3.2
Copper	7440-50-8	34.2	mg/kg	6.1		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		6.1
Copper	7440-50-8	15.4	mg/kg	0.496	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Copper	7440-50-8	20.5	mg/kg	0.567	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Copper	7440-50-8	27.9	mg/kg	3.2		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		3.2
Copper	7440-50-8	37.7	mg/kg	0.431	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.215
Copper	7440-50-8	7.71	mg/kg	0.49		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.245
Copper	7440-50-8	10.4	mg/kg	0.4715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.2355
Copper	7440-50-8	10.4	mg/kg	0.489		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.244
Copper	7440-50-8	21.3	mg/kg	0.484		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.242
Copper	7440-50-8	26.6	mg/kg	0.419	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.209
Copper	7440-50-8	25.4	mg/kg	0.413	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.207
Copper	7440-50-8	27	mg/kg	0.451	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.226
Copper	7440-50-8	27.6	mg/kg	0.476	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.238
Copper	7440-50-8	24.4	mg/kg	0.456	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.228
Copper	7440-50-8	27.3	mg/kg	0.446		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.223
Copper	7440-50-8	30.7	mg/kg	0.474		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.237
Copper	7440-50-8	29.2	mg/kg	0.47		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.235
Copper	7440-50-8	32.7	mg/kg	0.472	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.236
Copper	7440-50-8	28.4	mg/kg	0.482		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.241
Copper	7440-50-8	30.75	mg/kg	0.4525	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.2265
Dibenz(a,h)anthracene	53-70-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.111
Dibenz(a,h)anthracene	53-70-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.11
Dibenz(a,h)anthracene	53-70-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.104
Dibenz(a,h)anthracene	53-70-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.536
Dibenz(a,h)anthracene	53-70-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.472
Dibenz(a,h)anthracene	53-70-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.121
Dibenz(a,h)anthracene	53-70-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dibenz(a,h)anthracene	53-70-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0928
Dibenz(a,h)anthracene	53-70-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.101
Dibenz(a,h)anthracene	53-70-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dibenz(a,h)anthracene	53-70-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0947

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dibenz(a,h)anthracene	53-70-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0874
Dibenz(a,h)anthracene	53-70-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.091
Dibenz(a,h)anthracene	53-70-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0906
Dibenz(a,h)anthracene	53-70-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.106
Dibenz(a,h)anthracene	53-70-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0912
Dibenz(a,h)anthracene	53-70-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.09
Dibenz(a,h)anthracene	53-70-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0914
Dibenz(a,h)anthracene	53-70-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0932
Dibenz(a,h)anthracene	53-70-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.092
Dibenz(a,h)anthracene	53-70-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0906
Dibenz(a,h)anthracene	53-70-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0932
Dibenz(a,h)anthracene	53-70-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0938
Dibenz(a,h)anthracene	53-70-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0867
Dibenz(a,h)anthracene	53-70-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0932
Dibenz(a,h)anthracene	53-70-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.08425
Dibenzofuran	132-64-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00823
Dibenzofuran	132-64-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00815
Dibenzofuran	132-64-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Dibenzofuran	132-64-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0399
Dibenzofuran	132-64-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0351
Dibenzofuran	132-64-9	0.0757	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.00902
Dibenzofuran	132-64-9	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dibenzofuran	132-64-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0069
Dibenzofuran	132-64-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00753
Dibenzofuran	132-64-9	0.21	mg/kg	0.42	UJ	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dibenzofuran	132-64-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00704
Dibenzofuran	132-64-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0065
Dibenzofuran	132-64-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.006765
Dibenzofuran	132-64-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00674
Dibenzofuran	132-64-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00787
Dibenzofuran	132-64-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00678
Dibenzofuran	132-64-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00669
Dibenzofuran	132-64-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0068
Dibenzofuran	132-64-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00693
Dibenzofuran	132-64-9	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00684
Dibenzofuran	132-64-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00674
Dibenzofuran	132-64-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00693
Dibenzofuran	132-64-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00698
Dibenzofuran	132-64-9	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00645
Dibenzofuran	132-64-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00693
Dibenzofuran	132-64-9	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.006265
Dichlorobenzene, 1,2-	95-50-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Dichlorobenzene, 1,2-	95-50-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0112
Dichlorobenzene, 1,2-	95-50-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0106
Dichlorobenzene, 1,2-	95-50-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0548
Dichlorobenzene, 1,2-	95-50-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.04825
Dichlorobenzene, 1,2-	95-50-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0124
Dichlorobenzene, 1,2-	95-50-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,2-	95-50-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00949
Dichlorobenzene, 1,2-	95-50-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0104
Dichlorobenzene, 1,2-	95-50-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,2-	95-50-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00969
Dichlorobenzene, 1,2-	95-50-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00894
Dichlorobenzene, 1,2-	95-50-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.009305
Dichlorobenzene, 1,2-	95-50-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00927
Dichlorobenzene, 1,2-	95-50-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0108
Dichlorobenzene, 1,2-	95-50-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00933
Dichlorobenzene, 1,2-	95-50-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0092
Dichlorobenzene, 1,2-	95-50-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00934

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dichlorobenzene, 1,2-	95-50-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00953
Dichlorobenzene, 1,2-	95-50-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00941
Dichlorobenzene, 1,2-	95-50-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00927
Dichlorobenzene, 1,2-	95-50-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00953
Dichlorobenzene, 1,2-	95-50-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00959
Dichlorobenzene, 1,2-	95-50-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00887
Dichlorobenzene, 1,2-	95-50-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00953
Dichlorobenzene, 1,2-	95-50-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00861
Dichlorobenzene, 1,3-	541-73-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0178
Dichlorobenzene, 1,3-	541-73-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0176
Dichlorobenzene, 1,3-	541-73-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0167
Dichlorobenzene, 1,3-	541-73-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0861
Dichlorobenzene, 1,3-	541-73-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07585
Dichlorobenzene, 1,3-	541-73-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0195
Dichlorobenzene, 1,3-	541-73-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,3-	541-73-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0149
Dichlorobenzene, 1,3-	541-73-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0163
Dichlorobenzene, 1,3-	541-73-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,3-	541-73-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0152
Dichlorobenzene, 1,3-	541-73-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.014
Dichlorobenzene, 1,3-	541-73-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0146
Dichlorobenzene, 1,3-	541-73-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0146
Dichlorobenzene, 1,3-	541-73-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.017
Dichlorobenzene, 1,3-	541-73-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0147
Dichlorobenzene, 1,3-	541-73-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0145
Dichlorobenzene, 1,3-	541-73-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0147
Dichlorobenzene, 1,3-	541-73-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.015
Dichlorobenzene, 1,3-	541-73-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0148
Dichlorobenzene, 1,3-	541-73-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0146
Dichlorobenzene, 1,3-	541-73-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.015
Dichlorobenzene, 1,3-	541-73-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0151
Dichlorobenzene, 1,3-	541-73-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0139
Dichlorobenzene, 1,3-	541-73-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.015
Dichlorobenzene, 1,3-	541-73-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01355
Dichlorobenzene, 1,4-	106-46-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00956
Dichlorobenzene, 1,4-	106-46-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00946
Dichlorobenzene, 1,4-	106-46-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00894
Dichlorobenzene, 1,4-	106-46-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0463
Dichlorobenzene, 1,4-	106-46-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0407
Dichlorobenzene, 1,4-	106-46-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0105
Dichlorobenzene, 1,4-	106-46-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,4-	106-46-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00801
Dichlorobenzene, 1,4-	106-46-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00874
Dichlorobenzene, 1,4-	106-46-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,4-	106-46-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00818
Dichlorobenzene, 1,4-	106-46-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00754
Dichlorobenzene, 1,4-	106-46-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.007855
Dichlorobenzene, 1,4-	106-46-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00782
Dichlorobenzene, 1,4-	106-46-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00913
Dichlorobenzene, 1,4-	106-46-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00787
Dichlorobenzene, 1,4-	106-46-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00777
Dichlorobenzene, 1,4-	106-46-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00789
Dichlorobenzene, 1,4-	106-46-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00805
Dichlorobenzene, 1,4-	106-46-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00794
Dichlorobenzene, 1,4-	106-46-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00782
Dichlorobenzene, 1,4-	106-46-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00805
Dichlorobenzene, 1,4-	106-46-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0081
Dichlorobenzene, 1,4-	106-46-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00749
Dichlorobenzene, 1,4-	106-46-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00804

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dichlorobenzene, 1,4-	106-46-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00727
Dichlorobenzidine, 3,3'-	91-94-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
Dichlorobenzidine, 3,3'-	91-94-1	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
Dichlorobenzidine, 3,3'-	91-94-1	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
Dichlorobenzidine, 3,3'-	91-94-1	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
Dichlorobenzidine, 3,3'-	91-94-1	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2065
Dichlorobenzidine, 3,3'-	91-94-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531
Dichlorobenzidine, 3,3'-	91-94-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzidine, 3,3'-	91-94-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
Dichlorobenzidine, 3,3'-	91-94-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
Dichlorobenzidine, 3,3'-	91-94-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzidine, 3,3'-	91-94-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0415
Dichlorobenzidine, 3,3'-	91-94-1	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0383
Dichlorobenzidine, 3,3'-	91-94-1	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0399
Dichlorobenzidine, 3,3'-	91-94-1	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0397
Dichlorobenzidine, 3,3'-	91-94-1	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0464
Dichlorobenzidine, 3,3'-	91-94-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.04
Dichlorobenzidine, 3,3'-	91-94-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0394
Dichlorobenzidine, 3,3'-	91-94-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.04
Dichlorobenzidine, 3,3'-	91-94-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0409
Dichlorobenzidine, 3,3'-	91-94-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0403
Dichlorobenzidine, 3,3'-	91-94-1	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0397
Dichlorobenzidine, 3,3'-	91-94-1	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0408
Dichlorobenzidine, 3,3'-	91-94-1	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0411
Dichlorobenzidine, 3,3'-	91-94-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.038
Dichlorobenzidine, 3,3'-	91-94-1	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0408
Dichlorobenzidine, 3,3'-	91-94-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0369
Dichlorophenol, 2,4-	120-83-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Dichlorophenol, 2,4-	120-83-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Dichlorophenol, 2,4-	120-83-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Dichlorophenol, 2,4-	120-83-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Dichlorophenol, 2,4-	120-83-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
Dichlorophenol, 2,4-	120-83-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Dichlorophenol, 2,4-	120-83-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorophenol, 2,4-	120-83-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Dichlorophenol, 2,4-	120-83-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorophenol, 2,4-	120-83-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
Dichlorophenol, 2,4-	120-83-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
Dichlorophenol, 2,4-	120-83-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0144
Dichlorophenol, 2,4-	120-83-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
Dichlorophenol, 2,4-	120-83-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Dichlorophenol, 2,4-	120-83-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
Dichlorophenol, 2,4-	120-83-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
Dichlorophenol, 2,4-	120-83-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
Dichlorophenol, 2,4-	120-83-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0145
Dichlorophenol, 2,4-	120-83-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0143
Dichlorophenol, 2,4-	120-83-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0148
Dichlorophenol, 2,4-	120-83-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0137
Dichlorophenol, 2,4-	120-83-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0133
Diethyl phthalate	84-66-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Diethyl phthalate	84-66-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Diethyl phthalate	84-66-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186
Diethyl phthalate	84-66-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Diethyl phthalate	84-66-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08465
Diethyl phthalate	84-66-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Diethyl phthalate	84-66-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Diethyl phthalate	84-66-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Diethyl phthalate	84-66-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Diethyl phthalate	84-66-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Diethyl phthalate	84-66-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.017
Diethyl phthalate	84-66-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0157
Diethyl phthalate	84-66-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0163
Diethyl phthalate	84-66-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0163
Diethyl phthalate	84-66-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.019
Diethyl phthalate	84-66-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0164
Diethyl phthalate	84-66-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0161
Diethyl phthalate	84-66-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0164
Diethyl phthalate	84-66-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0167
Diethyl phthalate	84-66-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0165
Diethyl phthalate	84-66-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0163
Diethyl phthalate	84-66-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0167
Diethyl phthalate	84-66-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0168
Diethyl phthalate	84-66-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0155
Diethyl phthalate	84-66-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0167
Diethyl phthalate	84-66-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0151
Dimethyl phthalate	131-11-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Dimethyl phthalate	131-11-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Dimethyl phthalate	131-11-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014
Dimethyl phthalate	131-11-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Dimethyl phthalate	131-11-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0639
Dimethyl phthalate	131-11-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Dimethyl phthalate	131-11-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethyl phthalate	131-11-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126
Dimethyl phthalate	131-11-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Dimethyl phthalate	131-11-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dimethyl phthalate	131-11-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0128
Dimethyl phthalate	131-11-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0118
Dimethyl phthalate	131-11-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0123
Dimethyl phthalate	131-11-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0123
Dimethyl phthalate	131-11-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0143
Dimethyl phthalate	131-11-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0124
Dimethyl phthalate	131-11-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0122
Dimethyl phthalate	131-11-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0124
Dimethyl phthalate	131-11-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0126
Dimethyl phthalate	131-11-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0125
Dimethyl phthalate	131-11-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0123
Dimethyl phthalate	131-11-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0126
Dimethyl phthalate	131-11-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0127
Dimethyl phthalate	131-11-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0117
Dimethyl phthalate	131-11-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0126
Dimethyl phthalate	131-11-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01145
Dimethylphenol, 2,4-	105-67-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dimethylphenol, 2,4-	105-67-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0128
Dimethylphenol, 2,4-	105-67-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0121
Dimethylphenol, 2,4-	105-67-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0626
Dimethylphenol, 2,4-	105-67-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.05515
Dimethylphenol, 2,4-	105-67-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0142
Dimethylphenol, 2,4-	105-67-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethylphenol, 2,4-	105-67-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0108
Dimethylphenol, 2,4-	105-67-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0118

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dimethylphenol, 2,4-	105-67-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dimethylphenol, 2,4-	105-67-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0111
Dimethylphenol, 2,4-	105-67-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0102
Dimethylphenol, 2,4-	105-67-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0106
Dimethylphenol, 2,4-	105-67-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0106
Dimethylphenol, 2,4-	105-67-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0124
Dimethylphenol, 2,4-	105-67-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0107
Dimethylphenol, 2,4-	105-67-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0105
Dimethylphenol, 2,4-	105-67-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0107
Dimethylphenol, 2,4-	105-67-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0109
Dimethylphenol, 2,4-	105-67-9	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0108
Dimethylphenol, 2,4-	105-67-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0106
Dimethylphenol, 2,4-	105-67-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0109
Dimethylphenol, 2,4-	105-67-9	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.011
Dimethylphenol, 2,4-	105-67-9	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0101
Dimethylphenol, 2,4-	105-67-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0109
Dimethylphenol, 2,4-	105-67-9	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.009845
Di-n-butyl phthalate	84-74-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Di-n-butyl phthalate	84-74-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Di-n-butyl phthalate	84-74-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Di-n-butyl phthalate	84-74-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Di-n-butyl phthalate	84-74-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0451
Di-n-butyl phthalate	84-74-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Di-n-butyl phthalate	84-74-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-butyl phthalate	84-74-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Di-n-butyl phthalate	84-74-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Di-n-butyl phthalate	84-74-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Di-n-butyl phthalate	84-74-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Di-n-butyl phthalate	84-74-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Di-n-butyl phthalate	84-74-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0087
Di-n-butyl phthalate	84-74-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Di-n-butyl phthalate	84-74-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0101
Di-n-butyl phthalate	84-74-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Di-n-butyl phthalate	84-74-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Di-n-butyl phthalate	84-74-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Di-n-butyl phthalate	84-74-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00891
Di-n-butyl phthalate	84-74-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0088
Di-n-butyl phthalate	84-74-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00867
Di-n-butyl phthalate	84-74-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Di-n-butyl phthalate	84-74-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00897
Di-n-butyl phthalate	84-74-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00829
Di-n-butyl phthalate	84-74-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Di-n-butyl phthalate	84-74-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00805
Dinitro-2-methylphenol, 4,6-	534-52-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0492
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0488
Dinitro-2-methylphenol, 4,6-	534-52-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0461
Dinitro-2-methylphenol, 4,6-	534-52-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.238
Dinitro-2-methylphenol, 4,6-	534-52-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.21
Dinitro-2-methylphenol, 4,6-	534-52-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.054
Dinitro-2-methylphenol, 4,6-	534-52-1	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitro-2-methylphenol, 4,6-	534-52-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0413
Dinitro-2-methylphenol, 4,6-	534-52-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.045
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0421
Dinitro-2-methylphenol, 4,6-	534-52-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0389
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0405
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0403
Dinitro-2-methylphenol, 4,6-	534-52-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0471
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0406

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dinitro-2-methylphenol, 4,6-	534-52-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.04
Dinitro-2-methylphenol, 4,6-	534-52-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0407
Dinitro-2-methylphenol, 4,6-	534-52-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0415
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0409
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0403
Dinitro-2-methylphenol, 4,6-	534-52-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0415
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0417
Dinitro-2-methylphenol, 4,6-	534-52-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0386
Dinitro-2-methylphenol, 4,6-	534-52-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0415
Dinitro-2-methylphenol, 4,6-	534-52-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.03745
Dinitrobenzene, 1,3-	99-65-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrobenzene, 1,3-	99-65-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrobenzene, 1,3-	99-65-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrobenzene, 1,3-	99-65-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Dinitrobenzene, 1,3-	99-65-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrobenzene, 1,3-	99-65-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrobenzene, 1,3-	99-65-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrobenzene, 1,3-	99-65-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrobenzene, 1,3-	99-65-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrobenzene, 1,3-	99-65-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Dinitrobenzene, 1,3-	99-65-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrobenzene, 1,3-	99-65-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrobenzene, 1,3-	99-65-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrobenzene, 1,3-	99-65-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrobenzene, 1,3-	99-65-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrobenzene, 1,3-	99-65-0	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Dinitrobenzene, 1,3-	99-65-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Dinitrobenzene, 1,3-	99-65-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Dinitrobenzene, 1,3-	99-65-0	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Dinitrobenzene, 1,3-	99-65-0	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Dinitrobenzene, 1,3-	99-65-0	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Dinitrobenzene, 1,3-	99-65-0	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Dinitrobenzene, 1,3-	99-65-0	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Dinitrophenol, 2,4-	51-28-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0781
Dinitrophenol, 2,4-	51-28-5	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0773
Dinitrophenol, 2,4-	51-28-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0731
Dinitrophenol, 2,4-	51-28-5	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.378
Dinitrophenol, 2,4-	51-28-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.3325
Dinitrophenol, 2,4-	51-28-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0855
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitrophenol, 2,4-	51-28-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitrophenol, 2,4-	51-28-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0654
Dinitrophenol, 2,4-	51-28-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0714
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Dinitrophenol, 2,4-	51-28-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0668
Dinitrophenol, 2,4-	51-28-5	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0616
Dinitrophenol, 2,4-	51-28-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.06415
Dinitrophenol, 2,4-	51-28-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0639
Dinitrophenol, 2,4-	51-28-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0746
Dinitrophenol, 2,4-	51-28-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0643
Dinitrophenol, 2,4-	51-28-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0635
Dinitrophenol, 2,4-	51-28-5	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0644
Dinitrophenol, 2,4-	51-28-5	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0657
Dinitrophenol, 2,4-	51-28-5	0.2035	mg/kg	0.407	UJ	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0649
Dinitrophenol, 2,4-	51-28-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0639
Dinitrophenol, 2,4-	51-28-5	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0657
Dinitrophenol, 2,4-	51-28-5	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0662
Dinitrophenol, 2,4-	51-28-5	0.192	mg/kg	0.384	UJ	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0612
Dinitrophenol, 2,4-	51-28-5	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0657
Dinitrophenol, 2,4-	51-28-5	0.1863	mg/kg	0.3725	UJUJ	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.05935
Dinitrotoluene, 2,4-	121-14-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0172
Dinitrotoluene, 2,4-	121-14-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,4-	121-14-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.017

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dinitrotoluene, 2,4-	121-14-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,4-	121-14-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0161
Dinitrotoluene, 2,4-	121-14-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,4-	121-14-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0833
Dinitrotoluene, 2,4-	121-14-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,4-	121-14-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.11295
Dinitrotoluene, 2,4-	121-14-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0188
Dinitrotoluene, 2,4-	121-14-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,4-	121-14-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.10585
Dinitrotoluene, 2,4-	121-14-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitrotoluene, 2,4-	121-14-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0144
Dinitrotoluene, 2,4-	121-14-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,4-	121-14-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0157
Dinitrotoluene, 2,4-	121-14-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,4-	121-14-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dinitrotoluene, 2,4-	121-14-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0147
Dinitrotoluene, 2,4-	121-14-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrotoluene, 2,4-	121-14-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrotoluene, 2,4-	121-14-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0136
Dinitrotoluene, 2,4-	121-14-2	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0881
Dinitrotoluene, 2,4-	121-14-2	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.08355
Dinitrotoluene, 2,4-	121-14-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrotoluene, 2,4-	121-14-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0141
Dinitrotoluene, 2,4-	121-14-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0164
Dinitrotoluene, 2,4-	121-14-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrotoluene, 2,4-	121-14-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0142
Dinitrotoluene, 2,4-	121-14-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrotoluene, 2,4-	121-14-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrotoluene, 2,4-	121-14-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.014
Dinitrotoluene, 2,4-	121-14-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrotoluene, 2,4-	121-14-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0142
Dinitrotoluene, 2,4-	121-14-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0145
Dinitrotoluene, 2,4-	121-14-2	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Dinitrotoluene, 2,4-	121-14-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0143
Dinitrotoluene, 2,4-	121-14-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Dinitrotoluene, 2,4-	121-14-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0141
Dinitrotoluene, 2,4-	121-14-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Dinitrotoluene, 2,4-	121-14-2	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Dinitrotoluene, 2,4-	121-14-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0145
Dinitrotoluene, 2,4-	121-14-2	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Dinitrotoluene, 2,4-	121-14-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0146
Dinitrotoluene, 2,4-	121-14-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0135
Dinitrotoluene, 2,4-	121-14-2	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Dinitrotoluene, 2,4-	121-14-2	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Dinitrotoluene, 2,4-	121-14-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0145
Dinitrotoluene, 2,4-	121-14-2	0.1643	mg/kg	0.3285	UJU	ASH PIT 1-SB09	AP0028AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07665
Dinitrotoluene, 2,4-	121-14-2	0.1618	mg/kg	0.3235	UJU	ASH PIT 1-SB09	AP0058AP0058	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07645
Dinitrotoluene, 2,6-	606-20-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0118
Dinitrotoluene, 2,6-	606-20-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,6-	606-20-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0116
Dinitrotoluene, 2,6-	606-20-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,6-	606-20-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.011
Dinitrotoluene, 2,6-	606-20-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,6-	606-20-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.057
Dinitrotoluene, 2,6-	606-20-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,6-	606-20-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1011
Dinitrotoluene, 2,6-	606-20-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dinitrotoluene, 2,6-	606-20-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,6-	606-20-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0945
Dinitrotoluene, 2,6-	606-20-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,6-	606-20-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Dinitrotoluene, 2,6-	606-20-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitrotoluene, 2,6-	606-20-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00986
Dinitrotoluene, 2,6-	606-20-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,6-	606-20-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0108
Dinitrotoluene, 2,6-	606-20-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,6-	606-20-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dinitrotoluene, 2,6-	606-20-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0101
Dinitrotoluene, 2,6-	606-20-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrotoluene, 2,6-	606-20-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrotoluene, 2,6-	606-20-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00928
Dinitrotoluene, 2,6-	606-20-2	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.08584
Dinitrotoluene, 2,6-	606-20-2	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.08133
Dinitrotoluene, 2,6-	606-20-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrotoluene, 2,6-	606-20-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00963
Dinitrotoluene, 2,6-	606-20-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0112
Dinitrotoluene, 2,6-	606-20-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrotoluene, 2,6-	606-20-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00969
Dinitrotoluene, 2,6-	606-20-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrotoluene, 2,6-	606-20-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrotoluene, 2,6-	606-20-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00956
Dinitrotoluene, 2,6-	606-20-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrotoluene, 2,6-	606-20-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00971
Dinitrotoluene, 2,6-	606-20-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00991
Dinitrotoluene, 2,6-	606-20-2	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Dinitrotoluene, 2,6-	606-20-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00978
Dinitrotoluene, 2,6-	606-20-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Dinitrotoluene, 2,6-	606-20-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00963
Dinitrotoluene, 2,6-	606-20-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Dinitrotoluene, 2,6-	606-20-2	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Dinitrotoluene, 2,6-	606-20-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0099
Dinitrotoluene, 2,6-	606-20-2	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Dinitrotoluene, 2,6-	606-20-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00997
Dinitrotoluene, 2,6-	606-20-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00921
Dinitrotoluene, 2,6-	606-20-2	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Dinitrotoluene, 2,6-	606-20-2	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Dinitrotoluene, 2,6-	606-20-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0099
Dinitrotoluene, 2,6-	606-20-2	0.1643	mg/kg	0.3285	UJU	ASH PIT 1-SB09	AP0028AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07453
Dinitrotoluene, 2,6-	606-20-2	0.1618	mg/kg	0.3235	UJU	ASH PIT 1-SB09	AP0058AP0058	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07442
Di-n-octyl phthalate	117-84-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0922
Di-n-octyl phthalate	117-84-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0912
Di-n-octyl phthalate	117-84-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0863
Di-n-octyl phthalate	117-84-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.446
Di-n-octyl phthalate	117-84-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.393
Di-n-octyl phthalate	117-84-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.101
Di-n-octyl phthalate	117-84-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-octyl phthalate	117-84-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0773
Di-n-octyl phthalate	117-84-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0843
Di-n-octyl phthalate	117-84-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Di-n-octyl phthalate	117-84-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0789
Di-n-octyl phthalate	117-84-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0728
Di-n-octyl phthalate	117-84-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.07575
Di-n-octyl phthalate	117-84-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0755
Di-n-octyl phthalate	117-84-0	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0881
Di-n-octyl phthalate	117-84-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.076
Di-n-octyl phthalate	117-84-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0749
Di-n-octyl phthalate	117-84-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0761
Di-n-octyl phthalate	117-84-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0776
Di-n-octyl phthalate	117-84-0	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0766
Di-n-octyl phthalate	117-84-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0755
Di-n-octyl phthalate	117-84-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0776
Di-n-octyl phthalate	117-84-0	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0781
Di-n-octyl phthalate	117-84-0	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0722
Di-n-octyl phthalate	117-84-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0776

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Di-n-octyl phthalate	117-84-0	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07015
DIPHENYLAMINE	122-39-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
DIPHENYLAMINE	122-39-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
DIPHENYLAMINE	122-39-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
DIPHENYLAMINE	122-39-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
DIPHENYLAMINE	122-39-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.2065
DIPHENYLAMINE	122-39-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531
DIPHENYLAMINE	122-39-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
DIPHENYLAMINE	122-39-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
DIPHENYLAMINE	122-39-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0415
DIPHENYLAMINE	122-39-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0383
DIPHENYLAMINE	122-39-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0399
DIPHENYLAMINE	122-39-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0397
DIPHENYLAMINE	122-39-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0464
DIPHENYLAMINE	122-39-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.04
DIPHENYLAMINE	122-39-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0394
DIPHENYLAMINE	122-39-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.04
DIPHENYLAMINE	122-39-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0409
DIPHENYLAMINE	122-39-4	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0403
DIPHENYLAMINE	122-39-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0397
DIPHENYLAMINE	122-39-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0408
DIPHENYLAMINE	122-39-4	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0411
DIPHENYLAMINE	122-39-4	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.038
DIPHENYLAMINE	122-39-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0408
DIPHENYLAMINE	122-39-4	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0369
Fluoranthene	206-44-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Fluoranthene	206-44-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Fluoranthene	206-44-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Fluoranthene	206-44-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Fluoranthene	206-44-0	1.875	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0451
Fluoranthene	206-44-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Fluoranthene	206-44-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Fluoranthene	206-44-0	0.0477	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.00887
Fluoranthene	206-44-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Fluoranthene	206-44-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Fluoranthene	206-44-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Fluoranthene	206-44-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Fluoranthene	206-44-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0087
Fluoranthene	206-44-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Fluoranthene	206-44-0	0.126	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0101
Fluoranthene	206-44-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Fluoranthene	206-44-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Fluoranthene	206-44-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Fluoranthene	206-44-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00891
Fluoranthene	206-44-0	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0088
Fluoranthene	206-44-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00867
Fluoranthene	206-44-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Fluoranthene	206-44-0	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00897
Fluoranthene	206-44-0	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00829
Fluoranthene	206-44-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00891
Fluoranthene	206-44-0	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00805
Fluorene	86-73-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0207
Fluorene	86-73-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0205
Fluorene	86-73-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Fluorene	86-73-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.1
Fluorene	86-73-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.08835
Fluorene	86-73-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0227
Fluorene	86-73-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Fluorene	86-73-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0174

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Fluorene	86-73-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.019
Fluorene	86-73-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Fluorene	86-73-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0177
Fluorene	86-73-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0164
Fluorene	86-73-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.01705
Fluorene	86-73-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.017
Fluorene	86-73-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0198
Fluorene	86-73-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0171
Fluorene	86-73-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0169
Fluorene	86-73-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0171
Fluorene	86-73-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0175
Fluorene	86-73-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0172
Fluorene	86-73-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.017
Fluorene	86-73-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0175
Fluorene	86-73-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0176
Fluorene	86-73-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0162
Fluorene	86-73-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0174
Fluorene	86-73-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0158
Hexachlorobenzene	118-74-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0304
Hexachlorobenzene	118-74-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Hexachlorobenzene	118-74-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Hexachlorobenzene	118-74-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Hexachlorobenzene	118-74-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.13
Hexachlorobenzene	118-74-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0333
Hexachlorobenzene	118-74-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobenzene	118-74-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0255
Hexachlorobenzene	118-74-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0278
Hexachlorobenzene	118-74-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorobenzene	118-74-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.026
Hexachlorobenzene	118-74-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.024
Hexachlorobenzene	118-74-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.025
Hexachlorobenzene	118-74-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0249
Hexachlorobenzene	118-74-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0291
Hexachlorobenzene	118-74-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0251
Hexachlorobenzene	118-74-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0247
Hexachlorobenzene	118-74-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0251
Hexachlorobenzene	118-74-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0256
Hexachlorobenzene	118-74-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0253
Hexachlorobenzene	118-74-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0249
Hexachlorobenzene	118-74-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0256
Hexachlorobenzene	118-74-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0258
Hexachlorobenzene	118-74-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0238
Hexachlorobenzene	118-74-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0256
Hexachlorobenzene	118-74-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.02315
Hexachlorobutadiene	87-68-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Hexachlorobutadiene	87-68-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.046
Hexachlorobutadiene	87-68-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Hexachlorobutadiene	87-68-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.225
Hexachlorobutadiene	87-68-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.198
Hexachlorobutadiene	87-68-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0509
Hexachlorobutadiene	87-68-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobutadiene	87-68-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0389
Hexachlorobutadiene	87-68-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0425
Hexachlorobutadiene	87-68-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorobutadiene	87-68-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0397
Hexachlorobutadiene	87-68-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0367
Hexachlorobutadiene	87-68-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0382
Hexachlorobutadiene	87-68-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.038
Hexachlorobutadiene	87-68-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0444

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Hexachlorobutadiene	87-68-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0383
Hexachlorobutadiene	87-68-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0378
Hexachlorobutadiene	87-68-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0383
Hexachlorobutadiene	87-68-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0391
Hexachlorobutadiene	87-68-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0386
Hexachlorobutadiene	87-68-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.038
Hexachlorobutadiene	87-68-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0391
Hexachlorobutadiene	87-68-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0394
Hexachlorobutadiene	87-68-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0364
Hexachlorobutadiene	87-68-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0391
Hexachlorobutadiene	87-68-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.03535
Hexachlorocyclopentadiene	77-47-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0156
Hexachlorocyclopentadiene	77-47-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0154
Hexachlorocyclopentadiene	77-47-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
Hexachlorocyclopentadiene	77-47-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0755
Hexachlorocyclopentadiene	77-47-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.06645
Hexachlorocyclopentadiene	77-47-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0171
Hexachlorocyclopentadiene	77-47-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorocyclopentadiene	77-47-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0142
Hexachlorocyclopentadiene	77-47-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorocyclopentadiene	77-47-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0133
Hexachlorocyclopentadiene	77-47-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0123
Hexachlorocyclopentadiene	77-47-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0128
Hexachlorocyclopentadiene	77-47-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0128
Hexachlorocyclopentadiene	77-47-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0149
Hexachlorocyclopentadiene	77-47-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0128
Hexachlorocyclopentadiene	77-47-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0127
Hexachlorocyclopentadiene	77-47-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0129
Hexachlorocyclopentadiene	77-47-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.013
Hexachlorocyclopentadiene	77-47-4	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0128
Hexachlorocyclopentadiene	77-47-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0132
Hexachlorocyclopentadiene	77-47-4	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0122
Hexachlorocyclopentadiene	77-47-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01185
Hexachloroethane	67-72-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Hexachloroethane	67-72-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Hexachloroethane	67-72-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014
Hexachloroethane	67-72-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Hexachloroethane	67-72-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0639
Hexachloroethane	67-72-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Hexachloroethane	67-72-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachloroethane	67-72-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126
Hexachloroethane	67-72-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Hexachloroethane	67-72-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachloroethane	67-72-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0128
Hexachloroethane	67-72-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0118
Hexachloroethane	67-72-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0123
Hexachloroethane	67-72-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0123
Hexachloroethane	67-72-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0143
Hexachloroethane	67-72-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0124
Hexachloroethane	67-72-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0122
Hexachloroethane	67-72-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0124
Hexachloroethane	67-72-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0126
Hexachloroethane	67-72-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0125
Hexachloroethane	67-72-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0123
Hexachloroethane	67-72-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0126

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Hexachloroethane	67-72-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0127
Hexachloroethane	67-72-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0117
Hexachloroethane	67-72-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0126
Hexachloroethane	67-72-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01145
HMX	2691-41-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
HMX	2691-41-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
HMX	2691-41-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
HMX	2691-41-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
HMX	2691-41-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
HMX	2691-41-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
HMX	2691-41-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
HMX	2691-41-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
HMX	2691-41-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
HMX	2691-41-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
HMX	2691-41-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
HMX	2691-41-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
HMX	2691-41-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
HMX	2691-41-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
HMX	2691-41-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
HMX	2691-41-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
HMX	2691-41-0	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
HMX	2691-41-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
HMX	2691-41-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
HMX	2691-41-0	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
HMX	2691-41-0	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
HMX	2691-41-0	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
HMX	2691-41-0	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
HMX	2691-41-0	0.1398	mg/kg	0.2795	UJU	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Indeno(1,2,3-cd)pyrene	193-39-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.159
Indeno(1,2,3-cd)pyrene	193-39-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.157
Indeno(1,2,3-cd)pyrene	193-39-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.149
Indeno(1,2,3-cd)pyrene	193-39-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.769
Indeno(1,2,3-cd)pyrene	193-39-5	1.815	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.677
Indeno(1,2,3-cd)pyrene	193-39-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.174
Indeno(1,2,3-cd)pyrene	193-39-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Indeno(1,2,3-cd)pyrene	193-39-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.133
Indeno(1,2,3-cd)pyrene	193-39-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.145
Indeno(1,2,3-cd)pyrene	193-39-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Indeno(1,2,3-cd)pyrene	193-39-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.136
Indeno(1,2,3-cd)pyrene	193-39-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.125
Indeno(1,2,3-cd)pyrene	193-39-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.1305
Indeno(1,2,3-cd)pyrene	193-39-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.13
Indeno(1,2,3-cd)pyrene	193-39-5	0.312	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.152
Indeno(1,2,3-cd)pyrene	193-39-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.131
Indeno(1,2,3-cd)pyrene	193-39-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.129
Indeno(1,2,3-cd)pyrene	193-39-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.131
Indeno(1,2,3-cd)pyrene	193-39-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.134
Indeno(1,2,3-cd)pyrene	193-39-5	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.132
Indeno(1,2,3-cd)pyrene	193-39-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.13
Indeno(1,2,3-cd)pyrene	193-39-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.134
Indeno(1,2,3-cd)pyrene	193-39-5	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.135
Indeno(1,2,3-cd)pyrene	193-39-5	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.124
Indeno(1,2,3-cd)pyrene	193-39-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.134
Indeno(1,2,3-cd)pyrene	193-39-5	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.1205
Iron	7439-89-6	36500	mg/kg	4.61		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	B	2.3
Iron	7439-89-6	63100	mg/kg	20.9		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		10.5
Iron	7439-89-6	90300	mg/kg	20.5		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		10.2
Iron	7439-89-6	64800	mg/kg	20.6		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		10.3
Iron	7439-89-6	46500	mg/kg	12.855		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		6.44
Iron	7439-89-6	26500	mg/kg	4.84		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	B	2.42
Iron	7439-89-6	21600	mg/kg	14.15		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		14.15
Iron	7439-89-6	95100	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Iron	7439-89-6	29000	mg/kg	16.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		16.7

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Iron	7439-89-6	70300	mg/kg	13		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		13
Iron	7439-89-6	73200	mg/kg	24.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		24.4
Iron	7439-89-6	17200	mg/kg	3.97		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	B	1.99
Iron	7439-89-6	41100	mg/kg	4.54		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	B	2.27
Iron	7439-89-6	45500	mg/kg	12.6		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		12.6
Iron	7439-89-6	21500	mg/kg	3.44		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	B	1.72
Iron	7439-89-6	10600	mg/kg	3.92		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.96
Iron	7439-89-6	23050	mg/kg	5.605		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		2.805
Iron	7439-89-6	62000	mg/kg	19.6		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		9.78
Iron	7439-89-6	47000	mg/kg	7.75		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		3.87
Iron	7439-89-6	20600	mg/kg	3.35		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	B	1.68
Iron	7439-89-6	15600	mg/kg	3.31		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	B	1.65
Iron	7439-89-6	22600	mg/kg	3.61		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	B	1.81
Iron	7439-89-6	20200	mg/kg	3.81		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	B	1.9
Iron	7439-89-6	18000	mg/kg	3.65		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	B	1.82
Iron	7439-89-6	18900	mg/kg	3.57		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		1.79
Iron	7439-89-6	32800	mg/kg	7.59		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		3.79
Iron	7439-89-6	23600	mg/kg	3.76		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		1.88
Iron	7439-89-6	23000	mg/kg	3.78		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10	B	1.89
Iron	7439-89-6	24400	mg/kg	3.86		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		1.93
Iron	7439-89-6	24200	mg/kg	3.62		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	BB	1.81
Isophorone	78-59-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Isophorone	78-59-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Isophorone	78-59-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Isophorone	78-59-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Isophorone	78-59-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02505
Isophorone	78-59-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Isophorone	78-59-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Isophorone	78-59-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Isophorone	78-59-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Isophorone	78-59-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Isophorone	78-59-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Isophorone	78-59-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Isophorone	78-59-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.004835
Isophorone	78-59-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Isophorone	78-59-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Isophorone	78-59-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Isophorone	78-59-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Isophorone	78-59-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Isophorone	78-59-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00495
Isophorone	78-59-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00489
Isophorone	78-59-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00481
Isophorone	78-59-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Isophorone	78-59-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00498
Isophorone	78-59-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00461
Isophorone	78-59-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Isophorone	78-59-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.004475
Lead	7439-92-1	9.65	mg/kg	0.595		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.297
Lead	7439-92-1	9.59	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Lead	7439-92-1	11.3	mg/kg	0.531		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.266
Lead	7439-92-1	12.3	mg/kg	0.551		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.276
Lead	7439-92-1	27.05	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.2375
Lead	7439-92-1	6.28	mg/kg	0.61		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.305
Lead	7439-92-1	8.3	mg/kg	0.42		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		0.42
Lead	7439-92-1	5.9	mg/kg	0.79		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		0.79
Lead	7439-92-1	8.1	mg/kg	0.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.5
Lead	7439-92-1	4.9	mg/kg	0.39		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.39
Lead	7439-92-1	5.6	mg/kg	0.73		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		0.73
Lead	7439-92-1	6.61	mg/kg	0.46		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.23
Lead	7439-92-1	8.3	mg/kg	0.577		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.288
Lead	7439-92-1	10.9	mg/kg	0.38		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.38
Lead	7439-92-1	14.6	mg/kg	0.479		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.239
Lead	7439-92-1	7.75	mg/kg	0.449		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.224

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Lead	7439-92-1	7.69	mg/kg	0.423		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.2115
Lead	7439-92-1	5.69	mg/kg	0.481		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.241
Lead	7439-92-1	9.36	mg/kg	0.531		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.265
Lead	7439-92-1	9	mg/kg	0.467		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.233
Lead	7439-92-1	12.3	mg/kg	0.514		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.257
Lead	7439-92-1	12.2	mg/kg	0.455		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.227
Lead	7439-92-1	10.9	mg/kg	0.415		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.208
Lead	7439-92-1	11.4	mg/kg	0.463		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.231
Lead	7439-92-1	12.3	mg/kg	0.509		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.255
Lead	7439-92-1	19.2	mg/kg	0.441		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.221
Lead	7439-92-1	12	mg/kg	0.492		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.246
Lead	7439-92-1	13.1	mg/kg	0.484		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.242
Lead	7439-92-1	13.6	mg/kg	0.51		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.255
Lead	7439-92-1	11.9	mg/kg	0.4615		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.2305
Magnesium	7439-95-4	5830	mg/kg	2.3		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.15
Magnesium	7439-95-4	1500	mg/kg	2.09		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.05
Magnesium	7439-95-4	782	mg/kg	2.05		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.02
Magnesium	7439-95-4	4010	mg/kg	2.06		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.03
Magnesium	7439-95-4	1915	mg/kg	1.9		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.9535
Magnesium	7439-95-4	3740	mg/kg	2.42		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.21
Magnesium	7439-95-4	1660	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Magnesium	7439-95-4	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Magnesium	7439-95-4	1470	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Magnesium	7439-95-4	651	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Magnesium	7439-95-4	3770	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Magnesium	7439-95-4	5030	mg/kg	1.99		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.993
Magnesium	7439-95-4	1730	mg/kg	2.27		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.13
Magnesium	7439-95-4	4910	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Magnesium	7439-95-4	16500	mg/kg	1.72		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.861
Magnesium	7439-95-4	6420	mg/kg	1.96		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.98
Magnesium	7439-95-4	1085	mg/kg	1.885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.9425
Magnesium	7439-95-4	961	mg/kg	1.96		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.978
Magnesium	7439-95-4	839	mg/kg	1.94		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.969
Magnesium	7439-95-4	16100	mg/kg	1.68		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.838
Magnesium	7439-95-4	13700	mg/kg	1.65		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.826
Magnesium	7439-95-4	11700	mg/kg	1.81		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.903
Magnesium	7439-95-4	18600	mg/kg	1.9		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.951
Magnesium	7439-95-4	20100	mg/kg	1.82		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.911
Magnesium	7439-95-4	17100	mg/kg	1.79		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.893
Magnesium	7439-95-4	3480	mg/kg	1.9		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.948
Magnesium	7439-95-4	15600	mg/kg	1.88		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.94
Magnesium	7439-95-4	11600	mg/kg	1.89		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.944
Magnesium	7439-95-4	12100	mg/kg	1.93		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.965
Magnesium	7439-95-4	10350	mg/kg	1.81		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.905
Manganese	7439-96-5	263	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Manganese	7439-96-5	306	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Manganese	7439-96-5	252	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Manganese	7439-96-5	241	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Manganese	7439-96-5	305	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Manganese	7439-96-5	199	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Manganese	7439-96-5	342	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Manganese	7439-96-5	2810	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Manganese	7439-96-5	825	mg/kg	2.15	J	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		2.15
Manganese	7439-96-5	199	mg/kg	3.9		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.9
Manganese	7439-96-5	125	mg/kg	2.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		2.5
Manganese	7439-96-5	181	mg/kg	1.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.9
Manganese	7439-96-5	1370	mg/kg	3.7		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		3.7
Manganese	7439-96-5	409	mg/kg	1.9		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		1.9
Manganese	7439-96-5	543	mg/kg	0.172		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Manganese	7439-96-5	266	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Manganese	7439-96-5	1055.5	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.09425
Manganese	7439-96-5	954	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Manganese	7439-96-5	469	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Manganese	7439-96-5	506	mg/kg	0.168		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Manganese	7439-96-5	251	mg/kg	0.165		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Manganese	7439-96-5	701	mg/kg	0.181		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Manganese	7439-96-5	524	mg/kg	0.19		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.0951

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Manganese	7439-96-5	472	mg/kg	0.182		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.0911
Manganese	7439-96-5	470	mg/kg	0.179		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.0893
Manganese	7439-96-5	4470	mg/kg	0.19		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.0948
Manganese	7439-96-5	484	mg/kg	0.188		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.094
Manganese	7439-96-5	373	mg/kg	0.189		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.0944
Manganese	7439-96-5	347	mg/kg	0.193		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.0965
Manganese	7439-96-5	453	mg/kg	0.181		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.0905
Mercury	7439-97-6	0.0357	mg/kg	0.03		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.015
Mercury	7439-97-6	0.0928	mg/kg	0.0296		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.0148
Mercury	7439-97-6	0.383	mg/kg	0.0274		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.0137
Mercury	7439-97-6	0.0756	mg/kg	0.0291		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.0146
Mercury	7439-97-6	0.157	mg/kg	0.02555		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.0128
Mercury	7439-97-6	0.0383	mg/kg	0.0323		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.0162
Mercury	7439-97-6	0.07	mg/kg	0.14	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.14
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.085	mg/kg	0.17	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.17
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.12	mg/kg	0.24	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.24
Mercury	7439-97-6	0.0123	mg/kg	0.0246	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.0123
Mercury	7439-97-6	0.0146	mg/kg	0.0248	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	J	0.0124
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.13
Mercury	7439-97-6	0.0196	mg/kg	0.0242	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.0121
Mercury	7439-97-6	0.0116	mg/kg	0.0232	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.0116
Mercury	7439-97-6	0.0303	mg/kg	0.02295		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.01145
Mercury	7439-97-6	0.0592	mg/kg	0.0224		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0112
Mercury	7439-97-6	0.0516	mg/kg	0.0265		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0133
Mercury	7439-97-6	0.0124	mg/kg	0.0212	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	J	0.0106
Mercury	7439-97-6	0.0121	mg/kg	0.0241	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.012
Mercury	7439-97-6	0.0118	mg/kg	0.0236	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.0118
Mercury	7439-97-6	0.0162	mg/kg	0.0214	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	J	0.0107
Mercury	7439-97-6	0.0159	mg/kg	0.0215	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	J	0.0108
Mercury	7439-97-6	0.0151	mg/kg	0.0234	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	J	0.0117
Mercury	7439-97-6	0.0195	mg/kg	0.0253	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	J	0.0127
Mercury	7439-97-6	0.0222	mg/kg	0.023	J	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	J	0.0115
Mercury	7439-97-6	0.0148	mg/kg	0.0239	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10	J	0.0119
Mercury	7439-97-6	0.0127	mg/kg	0.0254	U	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	U	0.0127
Mercury	7439-97-6	0.0144	mg/kg	0.02065	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	JJ	0.01033
Methylnaphthalene, 2-	91-57-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.128
Methylnaphthalene, 2-	91-57-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.127
Methylnaphthalene, 2-	91-57-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.12
Methylnaphthalene, 2-	91-57-6	0.942	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.622
Methylnaphthalene, 2-	91-57-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.548
Methylnaphthalene, 2-	91-57-6	0.363	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.141
Methylnaphthalene, 2-	91-57-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylnaphthalene, 2-	91-57-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.108
Methylnaphthalene, 2-	91-57-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.117
Methylnaphthalene, 2-	91-57-6	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylnaphthalene, 2-	91-57-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.11
Methylnaphthalene, 2-	91-57-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.101
Methylnaphthalene, 2-	91-57-6	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.106
Methylnaphthalene, 2-	91-57-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.105
Methylnaphthalene, 2-	91-57-6	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.123
Methylnaphthalene, 2-	91-57-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.106
Methylnaphthalene, 2-	91-57-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.104
Methylnaphthalene, 2-	91-57-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.106
Methylnaphthalene, 2-	91-57-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.108
Methylnaphthalene, 2-	91-57-6	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.107
Methylnaphthalene, 2-	91-57-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.105
Methylnaphthalene, 2-	91-57-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.108
Methylnaphthalene, 2-	91-57-6	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.109
Methylnaphthalene, 2-	91-57-6	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.101
Methylnaphthalene, 2-	91-57-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.108
Methylnaphthalene, 2-	91-57-6	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.09775

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Methylphenol, 2-	95-48-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00735
Methylphenol, 2-	95-48-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00728
Methylphenol, 2-	95-48-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00688
Methylphenol, 2-	95-48-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0356
Methylphenol, 2-	95-48-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0313
Methylphenol, 2-	95-48-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00805
Methylphenol, 2-	95-48-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 2-	95-48-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00616
Methylphenol, 2-	95-48-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00672
Methylphenol, 2-	95-48-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylphenol, 2-	95-48-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00629
Methylphenol, 2-	95-48-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0058
Methylphenol, 2-	95-48-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.006045
Methylphenol, 2-	95-48-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00602
Methylphenol, 2-	95-48-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00703
Methylphenol, 2-	95-48-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00606
Methylphenol, 2-	95-48-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00598
Methylphenol, 2-	95-48-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00607
Methylphenol, 2-	95-48-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00619
Methylphenol, 2-	95-48-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00611
Methylphenol, 2-	95-48-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00602
Methylphenol, 2-	95-48-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00619
Methylphenol, 2-	95-48-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00623
Methylphenol, 2-	95-48-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00576
Methylphenol, 2-	95-48-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00619
Methylphenol, 2-	95-48-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00559
Methylphenol, 4-	106-44-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0153
Methylphenol, 4-	106-44-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0151
Methylphenol, 4-	106-44-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0143
Methylphenol, 4-	106-44-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.074
Methylphenol, 4-	106-44-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.06515
Methylphenol, 4-	106-44-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0167
Methylphenol, 4-	106-44-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 4-	106-44-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0128
Methylphenol, 4-	106-44-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.014
Methylphenol, 4-	106-44-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylphenol, 4-	106-44-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0131
Methylphenol, 4-	106-44-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0121
Methylphenol, 4-	106-44-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0126
Methylphenol, 4-	106-44-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0125
Methylphenol, 4-	106-44-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0146
Methylphenol, 4-	106-44-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0126
Methylphenol, 4-	106-44-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0124
Methylphenol, 4-	106-44-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0126
Methylphenol, 4-	106-44-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0129
Methylphenol, 4-	106-44-5	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0127
Methylphenol, 4-	106-44-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0125
Methylphenol, 4-	106-44-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0129
Methylphenol, 4-	106-44-5	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.013
Methylphenol, 4-	106-44-5	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.012
Methylphenol, 4-	106-44-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0129
Methylphenol, 4-	106-44-5	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01165
Naphthalene	91-20-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Naphthalene	91-20-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0115
Naphthalene	91-20-3	0.0661	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0109
Naphthalene	91-20-3	0.764	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0562
Naphthalene	91-20-3	0.6595	mg/kg	2.085	JU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JU	0.0495
Naphthalene	91-20-3	0.247	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.0127
Naphthalene	91-20-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Naphthalene	91-20-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00974
Naphthalene	91-20-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0106
Naphthalene	91-20-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Naphthalene	91-20-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00994
Naphthalene	91-20-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00917
Naphthalene	91-20-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00955
Naphthalene	91-20-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00951
Naphthalene	91-20-3	0.0553	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0111
Naphthalene	91-20-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00957
Naphthalene	91-20-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00944
Naphthalene	91-20-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00959
Naphthalene	91-20-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00978
Naphthalene	91-20-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00966
Naphthalene	91-20-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00951
Naphthalene	91-20-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00978
Naphthalene	91-20-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00984
Naphthalene	91-20-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0091
Naphthalene	91-20-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00978
Naphthalene	91-20-3	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.00884
Nickel	7440-02-0	0.173	mg/kg	0.346	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.173
Nickel	7440-02-0	0.157	mg/kg	0.314	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.157
Nickel	7440-02-0	0.1535	mg/kg	0.307	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.153
Nickel	7440-02-0	0.1545	mg/kg	0.309	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.155
Nickel	7440-02-0	0.1428	mg/kg	0.2855	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	UU	0.143
Nickel	7440-02-0	0.1815	mg/kg	0.363	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.181
Nickel	7440-02-0	28.7	mg/kg	5.65		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		5.65
Nickel	7440-02-0	16.1	mg/kg	5.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	21.1	mg/kg	6.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		6.7
Nickel	7440-02-0	16.7	mg/kg	5.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	79.2	mg/kg	9.8		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		9.8
Nickel	7440-02-0	3.93	mg/kg	0.298	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.149
Nickel	7440-02-0	0.17	mg/kg	0.34	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.17
Nickel	7440-02-0	44.3	mg/kg	5.1		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		5.1
Nickel	7440-02-0	18.7	mg/kg	0.258	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.129
Nickel	7440-02-0	1.71	mg/kg	0.294		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.147
Nickel	7440-02-0	11.66	mg/kg	0.2825		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.1415
Nickel	7440-02-0	0.1465	mg/kg	0.293	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.147
Nickel	7440-02-0	0.1455	mg/kg	0.291	U	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.145
Nickel	7440-02-0	13.5	mg/kg	0.251	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.126
Nickel	7440-02-0	13.3	mg/kg	0.248	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.124
Nickel	7440-02-0	23.7	mg/kg	0.271	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.135
Nickel	7440-02-0	16.9	mg/kg	0.285	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.143
Nickel	7440-02-0	15	mg/kg	0.273	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.137
Nickel	7440-02-0	14.7	mg/kg	0.268		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.134
Nickel	7440-02-0	43.4	mg/kg	0.285		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.142
Nickel	7440-02-0	16.1	mg/kg	0.282		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.141
Nickel	7440-02-0	21.2	mg/kg	0.283	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.142
Nickel	7440-02-0	18.8	mg/kg	0.289		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.145
Nickel	7440-02-0	17.15	mg/kg	0.2715	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.1355
Nitroaniline, 2-	88-74-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0212
Nitroaniline, 2-	88-74-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.021
Nitroaniline, 2-	88-74-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0198
Nitroaniline, 2-	88-74-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Nitroaniline, 2-	88-74-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.09025
Nitroaniline, 2-	88-74-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0232
Nitroaniline, 2-	88-74-4	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 2-	88-74-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0177
Nitroaniline, 2-	88-74-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0194
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitroaniline, 2-	88-74-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0181
Nitroaniline, 2-	88-74-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Nitroaniline, 2-	88-74-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0174
Nitroaniline, 2-	88-74-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0173
Nitroaniline, 2-	88-74-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0202
Nitroaniline, 2-	88-74-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0174
Nitroaniline, 2-	88-74-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0172
Nitroaniline, 2-	88-74-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0175
Nitroaniline, 2-	88-74-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0178
Nitroaniline, 2-	88-74-4	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0176
Nitroaniline, 2-	88-74-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0173
Nitroaniline, 2-	88-74-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0178
Nitroaniline, 2-	88-74-4	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0179
Nitroaniline, 2-	88-74-4	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0166
Nitroaniline, 2-	88-74-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0178
Nitroaniline, 2-	88-74-4	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0161
Nitroaniline, 3-	99-09-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0166
Nitroaniline, 3-	99-09-2	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Nitroaniline, 3-	99-09-2	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0155
Nitroaniline, 3-	99-09-2	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0804
Nitroaniline, 3-	99-09-2	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07085
Nitroaniline, 3-	99-09-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0182
Nitroaniline, 3-	99-09-2	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 3-	99-09-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0139
Nitroaniline, 3-	99-09-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0152
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitroaniline, 3-	99-09-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0142
Nitroaniline, 3-	99-09-2	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0131
Nitroaniline, 3-	99-09-2	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.01365
Nitroaniline, 3-	99-09-2	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0136
Nitroaniline, 3-	99-09-2	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0159
Nitroaniline, 3-	99-09-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0137
Nitroaniline, 3-	99-09-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0135
Nitroaniline, 3-	99-09-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0137
Nitroaniline, 3-	99-09-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.014
Nitroaniline, 3-	99-09-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0138
Nitroaniline, 3-	99-09-2	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0136
Nitroaniline, 3-	99-09-2	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.014
Nitroaniline, 3-	99-09-2	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0141
Nitroaniline, 3-	99-09-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.013
Nitroaniline, 3-	99-09-2	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.014
Nitroaniline, 3-	99-09-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01265
Nitroaniline, 4-	100-01-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.173
Nitroaniline, 4-	100-01-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.172
Nitroaniline, 4-	100-01-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.162
Nitroaniline, 4-	100-01-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.84
Nitroaniline, 4-	100-01-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.7395
Nitroaniline, 4-	100-01-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.19
Nitroaniline, 4-	100-01-6	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 4-	100-01-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.145
Nitroaniline, 4-	100-01-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.159
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitroaniline, 4-	100-01-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.148
Nitroaniline, 4-	100-01-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.137
Nitroaniline, 4-	100-01-6	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.1425
Nitroaniline, 4-	100-01-6	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.142
Nitroaniline, 4-	100-01-6	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.166
Nitroaniline, 4-	100-01-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.143
Nitroaniline, 4-	100-01-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.141

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitroaniline, 4-	100-01-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.143
Nitroaniline, 4-	100-01-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.146
Nitroaniline, 4-	100-01-6	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.144
Nitroaniline, 4-	100-01-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.142
Nitroaniline, 4-	100-01-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.146
Nitroaniline, 4-	100-01-6	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.147
Nitroaniline, 4-	100-01-6	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.136
Nitroaniline, 4-	100-01-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.146
Nitroaniline, 4-	100-01-6	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.132
Nitrobenzene	98-95-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.016
Nitrobenzene	98-95-3	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrobenzene	98-95-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0159
Nitrobenzene	98-95-3	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrobenzene	98-95-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.015
Nitrobenzene	98-95-3	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrobenzene	98-95-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0776
Nitrobenzene	98-95-3	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrobenzene	98-95-3	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1104
Nitrobenzene	98-95-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0176
Nitrobenzene	98-95-3	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrobenzene	98-95-3	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1034
Nitrobenzene	98-95-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrobenzene	98-95-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0134
Nitrobenzene	98-95-3	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrobenzene	98-95-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0147
Nitrobenzene	98-95-3	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrobenzene	98-95-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Nitrobenzene	98-95-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0137
Nitrobenzene	98-95-3	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrobenzene	98-95-3	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrobenzene	98-95-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0127
Nitrobenzene	98-95-3	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0876
Nitrobenzene	98-95-3	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0831
Nitrobenzene	98-95-3	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrobenzene	98-95-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0131
Nitrobenzene	98-95-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0153
Nitrobenzene	98-95-3	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrobenzene	98-95-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0132
Nitrobenzene	98-95-3	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrobenzene	98-95-3	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrobenzene	98-95-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.013
Nitrobenzene	98-95-3	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrobenzene	98-95-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0132
Nitrobenzene	98-95-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0135
Nitrobenzene	98-95-3	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Nitrobenzene	98-95-3	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0133
Nitrobenzene	98-95-3	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Nitrobenzene	98-95-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0131
Nitrobenzene	98-95-3	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Nitrobenzene	98-95-3	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Nitrobenzene	98-95-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0135
Nitrobenzene	98-95-3	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Nitrobenzene	98-95-3	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0136
Nitrobenzene	98-95-3	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0126
Nitrobenzene	98-95-3	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Nitrobenzene	98-95-3	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Nitrobenzene	98-95-3	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0135
Nitrobenzene	98-95-3	0.1643	mg/kg	0.3285	UJU	ASH PIT 1-SB09	AP0028AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.07615
Nitrobenzene	98-95-3	0.1618	mg/kg	0.3235	UJU	ASH PIT 1-SB09	AP0058AP0058	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.076
Nitrophenol, 2-	88-75-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0173
Nitrophenol, 2-	88-75-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0172
Nitrophenol, 2-	88-75-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0162
Nitrophenol, 2-	88-75-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.084

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitrophenol, 2-	88-75-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07395
Nitrophenol, 2-	88-75-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.019
Nitrophenol, 2-	88-75-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrophenol, 2-	88-75-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0145
Nitrophenol, 2-	88-75-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0159
Nitrophenol, 2-	88-75-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Nitrophenol, 2-	88-75-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0148
Nitrophenol, 2-	88-75-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0137
Nitrophenol, 2-	88-75-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.01425
Nitrophenol, 2-	88-75-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0142
Nitrophenol, 2-	88-75-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0166
Nitrophenol, 2-	88-75-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0143
Nitrophenol, 2-	88-75-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0141
Nitrophenol, 2-	88-75-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0143
Nitrophenol, 2-	88-75-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0146
Nitrophenol, 2-	88-75-5	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0144
Nitrophenol, 2-	88-75-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0142
Nitrophenol, 2-	88-75-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0146
Nitrophenol, 2-	88-75-5	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0147
Nitrophenol, 2-	88-75-5	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0136
Nitrophenol, 2-	88-75-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0146
Nitrophenol, 2-	88-75-5	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0132
Nitrophenol, 4-	100-02-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0397
Nitrophenol, 4-	100-02-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0393
Nitrophenol, 4-	100-02-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0372
Nitrophenol, 4-	100-02-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.192
Nitrophenol, 4-	100-02-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1695
Nitrophenol, 4-	100-02-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0435
Nitrophenol, 4-	100-02-7	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitrophenol, 4-	100-02-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0333
Nitrophenol, 4-	100-02-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0363
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitrophenol, 4-	100-02-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.034
Nitrophenol, 4-	100-02-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0313
Nitrophenol, 4-	100-02-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.03265
Nitrophenol, 4-	100-02-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0325
Nitrophenol, 4-	100-02-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0379
Nitrophenol, 4-	100-02-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0327
Nitrophenol, 4-	100-02-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0323
Nitrophenol, 4-	100-02-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0328
Nitrophenol, 4-	100-02-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0334
Nitrophenol, 4-	100-02-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.033
Nitrophenol, 4-	100-02-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0325
Nitrophenol, 4-	100-02-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0334
Nitrophenol, 4-	100-02-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0336
Nitrophenol, 4-	100-02-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0311
Nitrophenol, 4-	100-02-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0334
Nitrophenol, 4-	100-02-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0302
Nitrotoluene, 2-	88-72-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 2-	88-72-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 2-	88-72-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 2-	88-72-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 2-	88-72-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 2-	88-72-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 2-	88-72-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 2-	88-72-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 2-	88-72-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 2-	88-72-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 2-	88-72-2	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Nitrotoluene, 2-	88-72-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 2-	88-72-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 2-	88-72-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrotoluene, 2-	88-72-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 2-	88-72-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 2-	88-72-2	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Nitrotoluene, 2-	88-72-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Nitrotoluene, 2-	88-72-2	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Nitrotoluene, 2-	88-72-2	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Nitrotoluene, 2-	88-72-2	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Nitrotoluene, 2-	88-72-2	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Nitrotoluene, 2-	88-72-2	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Nitrotoluene, 2-	88-72-2	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Nitrotoluene, 3-	99-08-1	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 3-	99-08-1	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 3-	99-08-1	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 3-	99-08-1	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 3-	99-08-1	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 3-	99-08-1	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 3-	99-08-1	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 3-	99-08-1	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 3-	99-08-1	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 3-	99-08-1	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 3-	99-08-1	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Nitrotoluene, 3-	99-08-1	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 3-	99-08-1	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 3-	99-08-1	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrotoluene, 3-	99-08-1	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 3-	99-08-1	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 3-	99-08-1	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Nitrotoluene, 3-	99-08-1	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Nitrotoluene, 3-	99-08-1	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Nitrotoluene, 3-	99-08-1	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Nitrotoluene, 3-	99-08-1	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Nitrotoluene, 3-	99-08-1	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Nitrotoluene, 3-	99-08-1	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Nitrotoluene, 3-	99-08-1	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Nitrotoluene, 4-	99-99-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 4-	99-99-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 4-	99-99-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 4-	99-99-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 4-	99-99-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Nitrotoluene, 4-	99-99-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 4-	99-99-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 4-	99-99-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 4-	99-99-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 4-	99-99-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 4-	99-99-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Nitrotoluene, 4-	99-99-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 4-	99-99-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 4-	99-99-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrotoluene, 4-	99-99-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 4-	99-99-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 4-	99-99-0	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Nitrotoluene, 4-	99-99-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Nitrotoluene, 4-	99-99-0	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Nitrotoluene, 4-	99-99-0	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Nitrotoluene, 4-	99-99-0	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Nitrotoluene, 4-	99-99-0	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Nitrotoluene, 4-	99-99-0	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Nitrotoluene, 4-	99-99-0	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
n-Nitrosodimethylamine	62-75-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0147
n-Nitrosodimethylamine	62-75-9	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
n-Nitrosodimethylamine	62-75-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0138
n-Nitrosodimethylamine	62-75-9	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0712
n-Nitrosodimethylamine	62-75-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0627
n-Nitrosodimethylamine	62-75-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0161

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
n-Nitrosodimethylamine	62-75-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0123
n-Nitrosodimethylamine	62-75-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0134
n-Nitrosodimethylamine	62-75-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0126
n-Nitrosodimethylamine	62-75-9	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0116
n-Nitrosodimethylamine	62-75-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0121
n-Nitrosodimethylamine	62-75-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.012
n-Nitrosodimethylamine	62-75-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0141
n-Nitrosodimethylamine	62-75-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0121
n-Nitrosodimethylamine	62-75-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.012
n-Nitrosodimethylamine	62-75-9	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0121
n-Nitrosodimethylamine	62-75-9	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0124
n-Nitrosodimethylamine	62-75-9	0.2035	mg/kg	0.407	UJ	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0122
n-Nitrosodimethylamine	62-75-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.012
n-Nitrosodimethylamine	62-75-9	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0124
n-Nitrosodimethylamine	62-75-9	0.2075	mg/kg	0.415	UJ	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0125
n-Nitrosodimethylamine	62-75-9	0.192	mg/kg	0.384	UJ	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0115
n-Nitrosodimethylamine	62-75-9	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0124
n-Nitrosodimethylamine	62-75-9	0.1863	mg/kg	0.3725	UJUJ	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.01115
n-Nitroso-di-n-propylamine	621-64-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
n-Nitroso-di-n-propylamine	621-64-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
n-Nitroso-di-n-propylamine	621-64-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
n-Nitroso-di-n-propylamine	621-64-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
n-Nitroso-di-n-propylamine	621-64-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.07455
n-Nitroso-di-n-propylamine	621-64-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
n-Nitroso-di-n-propylamine	621-64-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
n-Nitroso-di-n-propylamine	621-64-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
n-Nitroso-di-n-propylamine	621-64-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
n-Nitroso-di-n-propylamine	621-64-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
n-Nitroso-di-n-propylamine	621-64-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
n-Nitroso-di-n-propylamine	621-64-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0144
n-Nitroso-di-n-propylamine	621-64-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
n-Nitroso-di-n-propylamine	621-64-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
n-Nitroso-di-n-propylamine	621-64-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
n-Nitroso-di-n-propylamine	621-64-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
n-Nitroso-di-n-propylamine	621-64-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
n-Nitroso-di-n-propylamine	621-64-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0145
n-Nitroso-di-n-propylamine	621-64-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0143
n-Nitroso-di-n-propylamine	621-64-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0148
n-Nitroso-di-n-propylamine	621-64-7	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0137
n-Nitroso-di-n-propylamine	621-64-7	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0133
n-Nitrosodiphenylamine	86-30-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00691
n-Nitrosodiphenylamine	86-30-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00684
n-Nitrosodiphenylamine	86-30-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00647
n-Nitrosodiphenylamine	86-30-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0335
n-Nitrosodiphenylamine	86-30-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02945
n-Nitrosodiphenylamine	86-30-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00757
n-Nitrosodiphenylamine	86-30-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
n-Nitrosodiphenylamine	86-30-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00579
n-Nitrosodiphenylamine	86-30-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00632
n-Nitrosodiphenylamine	86-30-6	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
n-Nitrosodiphenylamine	86-30-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00591
n-Nitrosodiphenylamine	86-30-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00545
n-Nitrosodiphenylamine	86-30-6	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00568
n-Nitrosodiphenylamine	86-30-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00566
n-Nitrosodiphenylamine	86-30-6	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00661

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
n-Nitrosodiphenylamine	86-30-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00569
n-Nitrosodiphenylamine	86-30-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00562
n-Nitrosodiphenylamine	86-30-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0057
n-Nitrosodiphenylamine	86-30-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00582
n-Nitrosodiphenylamine	86-30-6	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00574
n-Nitrosodiphenylamine	86-30-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00566
n-Nitrosodiphenylamine	86-30-6	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00582
n-Nitrosodiphenylamine	86-30-6	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00586
n-Nitrosodiphenylamine	86-30-6	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00541
n-Nitrosodiphenylamine	86-30-6	0.206	mg/kg	0.412	UJ	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00582
n-Nitrosodiphenylamine	86-30-6	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.005255
Pentachlorophenol	87-86-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.044
Pentachlorophenol	87-86-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Pentachlorophenol	87-86-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0411
Pentachlorophenol	87-86-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.213
Pentachlorophenol	87-86-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.1875
Pentachlorophenol	87-86-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0482
Pentachlorophenol	87-86-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	1.1
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Pentachlorophenol	87-86-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Pentachlorophenol	87-86-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0369
Pentachlorophenol	87-86-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0402
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Pentachlorophenol	87-86-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0376
Pentachlorophenol	87-86-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0347
Pentachlorophenol	87-86-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.03615
Pentachlorophenol	87-86-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.036
Pentachlorophenol	87-86-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.042
Pentachlorophenol	87-86-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0362
Pentachlorophenol	87-86-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0357
Pentachlorophenol	87-86-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0363
Pentachlorophenol	87-86-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.037
Pentachlorophenol	87-86-5	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0365
Pentachlorophenol	87-86-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.036
Pentachlorophenol	87-86-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.037
Pentachlorophenol	87-86-5	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0373
Pentachlorophenol	87-86-5	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0344
Pentachlorophenol	87-86-5	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.037
Pentachlorophenol	87-86-5	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.03345
Phenanthrene	85-01-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0119
Phenanthrene	85-01-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0118
Phenanthrene	85-01-8	0.055	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0111
Phenanthrene	85-01-8	0.275	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0577
Phenanthrene	85-01-8	0.831	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.0508
Phenanthrene	85-01-8	0.156	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.013
Phenanthrene	85-01-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Phenanthrene	85-01-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00998
Phenanthrene	85-01-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0109
Phenanthrene	85-01-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Phenanthrene	85-01-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0102
Phenanthrene	85-01-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0094
Phenanthrene	85-01-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00979
Phenanthrene	85-01-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00975
Phenanthrene	85-01-8	0.075	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0114
Phenanthrene	85-01-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00981
Phenanthrene	85-01-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00968
Phenanthrene	85-01-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00983
Phenanthrene	85-01-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.01
Phenanthrene	85-01-8	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0099
Phenanthrene	85-01-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00975
Phenanthrene	85-01-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.01

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Phenanthrene	85-01-8	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0101
Phenanthrene	85-01-8	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00933
Phenanthrene	85-01-8	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.01
Phenanthrene	85-01-8	0.0833	mg/kg	0.3725	JJ	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	JJ	0.00906
Phenol	108-95-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Phenol	108-95-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Phenol	108-95-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Phenol	108-95-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Phenol	108-95-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.02505
Phenol	108-95-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Phenol	108-95-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Phenol	108-95-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Phenol	108-95-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Phenol	108-95-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Phenol	108-95-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Phenol	108-95-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Phenol	108-95-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.004835
Phenol	108-95-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Phenol	108-95-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Phenol	108-95-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Phenol	108-95-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Phenol	108-95-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Phenol	108-95-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00495
Phenol	108-95-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00489
Phenol	108-95-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00481
Phenol	108-95-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Phenol	108-95-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.00498
Phenol	108-95-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00461
Phenol	108-95-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00495
Phenol	108-95-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.004475
Potassium	7440-09-7	1190	mg/kg	28.8	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		14.4
Potassium	7440-09-7	1260	mg/kg	26.1		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		13.1
Potassium	7440-09-7	1280	mg/kg	25.6		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		12.8
Potassium	7440-09-7	1160	mg/kg	25.8		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		12.9
Potassium	7440-09-7	654	mg/kg	23.8		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		11.9
Potassium	7440-09-7	1040	mg/kg	30.2	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		15.1
Potassium	7440-09-7	873.5	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		707
Potassium	7440-09-7	1090	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Potassium	7440-09-7	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Potassium	7440-09-7	781	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Potassium	7440-09-7	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Potassium	7440-09-7	577	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		12.4
Potassium	7440-09-7	643	mg/kg	28.4	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		14.2
Potassium	7440-09-7	1720	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Potassium	7440-09-7	1110	mg/kg	21.5	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		10.8
Potassium	7440-09-7	299	mg/kg	24.5		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		12.3
Potassium	7440-09-7	289.5	mg/kg	23.55		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		11.8
Potassium	7440-09-7	164	mg/kg	24.4		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		12.2
Potassium	7440-09-7	559	mg/kg	24.2		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		12.1
Potassium	7440-09-7	1010	mg/kg	20.9	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		10.5
Potassium	7440-09-7	1130	mg/kg	20.7	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		10.3
Potassium	7440-09-7	1580	mg/kg	22.6	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		11.3
Potassium	7440-09-7	1270	mg/kg	23.8	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		11.9
Potassium	7440-09-7	1080	mg/kg	22.8	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		11.4
Potassium	7440-09-7	1070	mg/kg	22.3		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		11.2
Potassium	7440-09-7	948	mg/kg	23.7		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		11.9
Potassium	7440-09-7	1110	mg/kg	23.5		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		11.7
Potassium	7440-09-7	1260	mg/kg	23.6	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		11.8
Potassium	7440-09-7	1370	mg/kg	24.1		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		12.1
Potassium	7440-09-7	1225	mg/kg	22.65	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		11.3
Pyrene	129-00-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0196
Pyrene	129-00-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Pyrene	129-00-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0183

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Pyrene	129-00-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0947
Pyrene	129-00-0	1.32	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	JJ	0.08335
Pyrene	129-00-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0214
Pyrene	129-00-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Pyrene	129-00-0	0.0378	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.0164
Pyrene	129-00-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0179
Pyrene	129-00-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Pyrene	129-00-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0167
Pyrene	129-00-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0154
Pyrene	129-00-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0161
Pyrene	129-00-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.016
Pyrene	129-00-0	0.102	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0187
Pyrene	129-00-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0161
Pyrene	129-00-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0159
Pyrene	129-00-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0161
Pyrene	129-00-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0165
Pyrene	129-00-0	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0163
Pyrene	129-00-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.016
Pyrene	129-00-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0165
Pyrene	129-00-0	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0166
Pyrene	129-00-0	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0153
Pyrene	129-00-0	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0165
Pyrene	129-00-0	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0149
RDX	121-82-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
RDX	121-82-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
RDX	121-82-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
RDX	121-82-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
RDX	121-82-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
RDX	121-82-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
RDX	121-82-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
RDX	121-82-4	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
RDX	121-82-4	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
RDX	121-82-4	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
RDX	121-82-4	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
RDX	121-82-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
RDX	121-82-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
RDX	121-82-4	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
RDX	121-82-4	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
RDX	121-82-4	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
RDX	121-82-4	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
RDX	121-82-4	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
RDX	121-82-4	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
RDX	121-82-4	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
RDX	121-82-4	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
RDX	121-82-4	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
RDX	121-82-4	0.1398	mg/kg	0.2795	UJU	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Selenium	7782-49-2	0.618	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	J	0.595
Selenium	7782-49-2	0.567	mg/kg	1.05	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.526
Selenium	7782-49-2	0.6	mg/kg	1.06	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.531
Selenium	7782-49-2	0.592	mg/kg	1.1	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.551
Selenium	7782-49-2	0.4973	mg/kg	0.9515	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JU	0.476
Selenium	7782-49-2	0.61	mg/kg	1.22	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.61
Selenium	7782-49-2	0.665	mg/kg	0.71	/U	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	U	0.71
Selenium	7782-49-2	0.65	mg/kg	1.3	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	1.3
Selenium	7782-49-2	1.2	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Selenium	7782-49-2	2.7	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Selenium	7782-49-2	2.6	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Selenium	7782-49-2	0.4595	mg/kg	0.919	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.46
Selenium	7782-49-2	0.575	mg/kg	1.15	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.577
Selenium	7782-49-2	0.97	mg/kg	0.63		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.63
Selenium	7782-49-2	0.4785	mg/kg	0.957	UJ	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	U	0.479
Selenium	7782-49-2	0.449	mg/kg	0.898	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.449
Selenium	7782-49-2	0.4228	mg/kg	0.8455	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4	UU	0.423

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Selenium	7782-49-2	0.481	mg/kg	0.962	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.481
Selenium	7782-49-2	0.559	mg/kg	1.06	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.531
Selenium	7782-49-2	0.4665	mg/kg	0.933	UJ	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.467
Selenium	7782-49-2	0.515	mg/kg	1.03	UJ	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.514
Selenium	7782-49-2	0.4545	mg/kg	0.909	UJ	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.455
Selenium	7782-49-2	0.4155	mg/kg	0.831	UJ	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	U	0.415
Selenium	7782-49-2	0.4625	mg/kg	0.925	UJ	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	U	0.463
Selenium	7782-49-2	0.51	mg/kg	1.02	U	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	U	0.509
Selenium	7782-49-2	0.4415	mg/kg	0.883	U	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	U	0.441
Selenium	7782-49-2	0.492	mg/kg	0.984	U	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	U	0.492
Selenium	7782-49-2	0.761	mg/kg	0.968	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10	J	0.484
Selenium	7782-49-2	0.51	mg/kg	1.02	U	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	U	0.51
Selenium	7782-49-2	0.4613	mg/kg	0.9225	UJUJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	UU	0.4615
Silver	7440-22-4	0.288	mg/kg	0.576	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.288
Silver	7440-22-4	0.2615	mg/kg	0.523	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.261
Silver	7440-22-4	0.2555	mg/kg	0.511	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.256
Silver	7440-22-4	0.258	mg/kg	0.516	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.258
Silver	7440-22-4	0.238	mg/kg	0.476	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	UU	0.238
Silver	7440-22-4	0.3025	mg/kg	0.605	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.302
Silver	7440-22-4	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	0.71
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.6	mg/kg	1.2	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1.2
Silver	7440-22-4	0.248	mg/kg	0.496	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.248
Silver	7440-22-4	0.2835	mg/kg	0.567	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.284
Silver	7440-22-4	0.315	mg/kg	0.63	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.63
Silver	7440-22-4	0.2155	mg/kg	0.431	U	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	U	0.215
Silver	7440-22-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.245
Silver	7440-22-4	0.2358	mg/kg	0.4715	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4	UU	0.2355
Silver	7440-22-4	0.2445	mg/kg	0.489	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.244
Silver	7440-22-4	0.242	mg/kg	0.484	UJ	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.242
Silver	7440-22-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.209
Silver	7440-22-4	0.2065	mg/kg	0.413	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.207
Silver	7440-22-4	0.2255	mg/kg	0.451	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.226
Silver	7440-22-4	0.238	mg/kg	0.476	U	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	U	0.238
Silver	7440-22-4	0.228	mg/kg	0.456	U	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	U	0.228
Silver	7440-22-4	0.223	mg/kg	0.446	U	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	U	0.223
Silver	7440-22-4	0.237	mg/kg	0.474	U	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	U	0.237
Silver	7440-22-4	0.235	mg/kg	0.47	U	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	U	0.235
Silver	7440-22-4	0.236	mg/kg	0.472	U	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10	U	0.236
Silver	7440-22-4	0.241	mg/kg	0.482	U	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	U	0.241
Silver	7440-22-4	0.2263	mg/kg	0.4525	UU	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	UU	0.2265
Sodium	7440-23-5	114	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76
Sodium	7440-23-5	96.8	mg/kg	10.5		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		5.23
Sodium	7440-23-5	119	mg/kg	10.2		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		5.11
Sodium	7440-23-5	165	mg/kg	10.3		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		5.16
Sodium	7440-23-5	89.15	mg/kg	9.535	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		4.76
Sodium	7440-23-5	161	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Sodium	7440-23-5	353.5	mg/kg	707	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	707
Sodium	7440-23-5	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Sodium	7440-23-5	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Sodium	7440-23-5	324	mg/kg	648	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	648
Sodium	7440-23-5	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Sodium	7440-23-5	57.6	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Sodium	7440-23-5	70.4	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Sodium	7440-23-5	316	mg/kg	632	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	632
Sodium	7440-23-5	131	mg/kg	8.61		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		4.31
Sodium	7440-23-5	61.3	mg/kg	9.8		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		4.9
Sodium	7440-23-5	25	mg/kg	9.425		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		4.715
Sodium	7440-23-5	34.9	mg/kg	9.78		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		4.89
Sodium	7440-23-5	87.4	mg/kg	9.69		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		4.84
Sodium	7440-23-5	111	mg/kg	8.38		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		4.19
Sodium	7440-23-5	96	mg/kg	8.26		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		4.13
Sodium	7440-23-5	117	mg/kg	9.03		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		4.51
Sodium	7440-23-5	151	mg/kg	9.51		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		4.76
Sodium	7440-23-5	137	mg/kg	9.11		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		4.56

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Sodium	7440-23-5	132	mg/kg	8.93		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		4.46
Sodium	7440-23-5	45.9	mg/kg	9.48		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		4.74
Sodium	7440-23-5	107	mg/kg	9.4		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		4.7
Sodium	7440-23-5	118	mg/kg	9.44		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		4.72
Sodium	7440-23-5	98.5	mg/kg	9.65		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		4.82
Sodium	7440-23-5	152.5	mg/kg	9.05		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		4.525
Tetryl	479-45-8	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Tetryl	479-45-8	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Tetryl	479-45-8	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Tetryl	479-45-8	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Tetryl	479-45-8	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Tetryl	479-45-8	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Tetryl	479-45-8	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Tetryl	479-45-8	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Tetryl	479-45-8	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Tetryl	479-45-8	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Tetryl	479-45-8	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Tetryl	479-45-8	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Tetryl	479-45-8	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Tetryl	479-45-8	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Tetryl	479-45-8	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Tetryl	479-45-8	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Tetryl	479-45-8	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Tetryl	479-45-8	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Tetryl	479-45-8	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Tetryl	479-45-8	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Tetryl	479-45-8	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Tetryl	479-45-8	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Tetryl	479-45-8	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Tetryl	479-45-8	0.1395	mg/kg	0.279	UJ	ASH PIT 1-SB09	AP0058	EXPLOSIVES	AVGD	8-Dec-08	8	10	U	0.14
Thallium	7440-28-0	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Thallium	7440-28-0	0.563	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Thallium	7440-28-0	0.356	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Thallium	7440-28-0	0.303	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Thallium	7440-28-0	0.274	mg/kg	0.476	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1	JJ	0.2375
Thallium	7440-28-0	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Thallium	7440-28-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	UU	1.4
Thallium	7440-28-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Thallium	7440-28-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Thallium	7440-28-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Thallium	7440-28-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Thallium	7440-28-0	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Thallium	7440-28-0	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Thallium	7440-28-0	0.65	mg/kg	1.3	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	1.3
Thallium	7440-28-0	0.343	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Thallium	7440-28-0	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Thallium	7440-28-0	0.2115	mg/kg	0.423	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4	UU	0.2115
Thallium	7440-28-0	0.2405	mg/kg	0.481	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.241
Thallium	7440-28-0	0.275	mg/kg	0.531	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.265
Thallium	7440-28-0	0.2335	mg/kg	0.467	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Thallium	7440-28-0	0.366	mg/kg	0.514	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	J	0.257
Thallium	7440-28-0	0.239	mg/kg	0.455	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	J	0.227
Thallium	7440-28-0	0.271	mg/kg	0.415	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10	J	0.208
Thallium	7440-28-0	0.2315	mg/kg	0.463	U	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10	U	0.231
Thallium	7440-28-0	0.301	mg/kg	0.509	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10	J	0.255
Thallium	7440-28-0	0.354	mg/kg	0.441	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10	J	0.221
Thallium	7440-28-0	0.405	mg/kg	0.492	J	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9	J	0.246
Thallium	7440-28-0	0.663	mg/kg	0.484		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.242
Thallium	7440-28-0	0.333	mg/kg	0.51	J	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10	J	0.255
Thallium	7440-28-0	0.3975	mg/kg	0.4615	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10	JJ	0.2305
Total organic carbon	10-35-5	65	mg/kg	130	U	PBOW99-SBA102A	PBOW99SBA102A	TOC	REG	10-Jun-99	0	1	U	130
Total organic carbon	10-35-5	55.3	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	TOC-W	REG	8-Dec-08	0.5	1.5	B	0.62
Total organic carbon	10-35-5	1900	mg/kg	130		PBOW99-SBA103B	PBOW99SBA103B	TOC	REG	10-Jun-99	1	4		130
Trichlorobenzene, 1,2,4-	120-82-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Trichlorobenzene, 1,2,4-	120-82-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Trichlorobenzene, 1,2,4-	120-82-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Trichlorobenzene, 1,2,4-	120-82-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Trichlorobenzene, 1,2,4-	120-82-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.0514
Trichlorobenzene, 1,2,4-	120-82-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132
Trichlorobenzene, 1,2,4-	120-82-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorobenzene, 1,2,4-	120-82-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Trichlorobenzene, 1,2,4-	120-82-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Trichlorobenzene, 1,2,4-	120-82-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorobenzene, 1,2,4-	120-82-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0103
Trichlorobenzene, 1,2,4-	120-82-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00952
Trichlorobenzene, 1,2,4-	120-82-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.00991
Trichlorobenzene, 1,2,4-	120-82-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00987
Trichlorobenzene, 1,2,4-	120-82-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0115
Trichlorobenzene, 1,2,4-	120-82-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00993
Trichlorobenzene, 1,2,4-	120-82-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0098
Trichlorobenzene, 1,2,4-	120-82-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00995
Trichlorobenzene, 1,2,4-	120-82-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0102
Trichlorobenzene, 1,2,4-	120-82-1	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.01
Trichlorobenzene, 1,2,4-	120-82-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.00987
Trichlorobenzene, 1,2,4-	120-82-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0101
Trichlorobenzene, 1,2,4-	120-82-1	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0102
Trichlorobenzene, 1,2,4-	120-82-1	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.00944
Trichlorobenzene, 1,2,4-	120-82-1	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0101
Trichlorobenzene, 1,2,4-	120-82-1	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.009175
Trichlorophenol, 2,4,5-	95-95-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.042
Trichlorophenol, 2,4,5-	95-95-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0416
Trichlorophenol, 2,4,5-	95-95-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0394
Trichlorophenol, 2,4,5-	95-95-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.204
Trichlorophenol, 2,4,5-	95-95-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.179
Trichlorophenol, 2,4,5-	95-95-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0461
Trichlorophenol, 2,4,5-	95-95-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorophenol, 2,4,5-	95-95-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0352
Trichlorophenol, 2,4,5-	95-95-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0384
Trichlorophenol, 2,4,5-	95-95-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorophenol, 2,4,5-	95-95-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.036
Trichlorophenol, 2,4,5-	95-95-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0332
Trichlorophenol, 2,4,5-	95-95-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.03455
Trichlorophenol, 2,4,5-	95-95-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0344
Trichlorophenol, 2,4,5-	95-95-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0402
Trichlorophenol, 2,4,5-	95-95-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0346
Trichlorophenol, 2,4,5-	95-95-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0342
Trichlorophenol, 2,4,5-	95-95-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0347
Trichlorophenol, 2,4,5-	95-95-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0354
Trichlorophenol, 2,4,5-	95-95-4	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.035
Trichlorophenol, 2,4,5-	95-95-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0344
Trichlorophenol, 2,4,5-	95-95-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0354
Trichlorophenol, 2,4,5-	95-95-4	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.0356
Trichlorophenol, 2,4,5-	95-95-4	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0329
Trichlorophenol, 2,4,5-	95-95-4	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0354
Trichlorophenol, 2,4,5-	95-95-4	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.032
Trichlorophenol, 2,4,6-	88-06-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0331
Trichlorophenol, 2,4,6-	88-06-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0327
Trichlorophenol, 2,4,6-	88-06-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.031
Trichlorophenol, 2,4,6-	88-06-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.16
Trichlorophenol, 2,4,6-	88-06-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	9-Dec-08	0	1	UU	0.141
Trichlorophenol, 2,4,6-	88-06-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0362
Trichlorophenol, 2,4,6-	88-06-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOV	SEMIVOLATILES	AVGD	11-Jun-99	0	0.5	UU	0.465
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Trichlorophenol, 2,4,6-	88-06-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0277
Trichlorophenol, 2,4,6-	88-06-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0302
Trichlorophenol, 2,4,6-	88-06-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorophenol, 2,4,6-	88-06-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0283
Trichlorophenol, 2,4,6-	88-06-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0261
Trichlorophenol, 2,4,6-	88-06-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	9-Dec-08	3	4	UU	0.0272
Trichlorophenol, 2,4,6-	88-06-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0271
Trichlorophenol, 2,4,6-	88-06-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0316
Trichlorophenol, 2,4,6-	88-06-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0273
Trichlorophenol, 2,4,6-	88-06-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0269
Trichlorophenol, 2,4,6-	88-06-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0273
Trichlorophenol, 2,4,6-	88-06-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB01	AP0003	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0279
Trichlorophenol, 2,4,6-	88-06-2	0.2035	mg/kg	0.407	U	ASH PIT 1-SB02	AP0006	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0275
Trichlorophenol, 2,4,6-	88-06-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB03	AP0009	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0271
Trichlorophenol, 2,4,6-	88-06-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB04	AP0013	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0279
Trichlorophenol, 2,4,6-	88-06-2	0.2075	mg/kg	0.415	U	ASH PIT 1-SB05	AP0016	SEMIVOLATILES	REG	9-Dec-08	8	9	U	0.028
Trichlorophenol, 2,4,6-	88-06-2	0.192	mg/kg	0.384	U	ASH PIT 1-SB06	AP0019	SEMIVOLATILES	REG	8-Dec-08	8	10	U	0.0259
Trichlorophenol, 2,4,6-	88-06-2	0.206	mg/kg	0.412	U	ASH PIT 1-SB08	AP0025	SEMIVOLATILES	REG	9-Dec-08	8	10	U	0.0278
Trichlorophenol, 2,4,6-	88-06-2	0.1863	mg/kg	0.3725	UU	ASH PIT 1-SB09	AP0058AP0028	SEMIVOLATILES	AVGD	8-Dec-08	8	10	UU	0.0252
Trinitrobenzene, 1,3,5-	99-35-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrobenzene, 1,3,5-	99-35-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrobenzene, 1,3,5-	99-35-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrobenzene, 1,3,5-	99-35-4	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Trinitrobenzene, 1,3,5-	99-35-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Trinitrobenzene, 1,3,5-	99-35-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrobenzene, 1,3,5-	99-35-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrobenzene, 1,3,5-	99-35-4	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Trinitrobenzene, 1,3,5-	99-35-4	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Trinitrobenzene, 1,3,5-	99-35-4	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Trinitrobenzene, 1,3,5-	99-35-4	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Trinitrobenzene, 1,3,5-	99-35-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Trinitrobenzene, 1,3,5-	99-35-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Trinitrobenzene, 1,3,5-	99-35-4	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Trinitrobenzene, 1,3,5-	99-35-4	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Trinitrobenzene, 1,3,5-	99-35-4	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Trinitrobenzene, 1,3,5-	99-35-4	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Trinitrobenzene, 1,3,5-	99-35-4	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Trinitrobenzene, 1,3,5-	99-35-4	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Trinitrobenzene, 1,3,5-	99-35-4	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Trinitrobenzene, 1,3,5-	99-35-4	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Trinitrobenzene, 1,3,5-	99-35-4	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Trinitrobenzene, 1,3,5-	99-35-4	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14
Trinitrotoluene, 2,4,6-	118-96-7	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrotoluene, 2,4,6-	118-96-7	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrotoluene, 2,4,6-	118-96-7	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrotoluene, 2,4,6-	118-96-7	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	9-Dec-08	0	1	UU	0.1455
Trinitrotoluene, 2,4,6-	118-96-7	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Trinitrotoluene, 2,4,6-	118-96-7	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrotoluene, 2,4,6-	118-96-7	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrotoluene, 2,4,6-	118-96-7	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Trinitrotoluene, 2,4,6-	118-96-7	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Trinitrotoluene, 2,4,6-	118-96-7	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	9-Dec-08	3	4	UU	0.1575
Trinitrotoluene, 2,4,6-	118-96-7	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Trinitrotoluene, 2,4,6-	118-96-7	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Trinitrotoluene, 2,4,6-	118-96-7	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Trinitrotoluene, 2,4,6-	118-96-7	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Trinitrotoluene, 2,4,6-	118-96-7	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Trinitrotoluene, 2,4,6-	118-96-7	0.157	mg/kg	0.314	UJ	ASH PIT 1-SB01	AP0003	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.157
Trinitrotoluene, 2,4,6-	118-96-7	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB02	AP0006	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.149
Trinitrotoluene, 2,4,6-	118-96-7	0.1485	mg/kg	0.297	UJ	ASH PIT 1-SB03	AP0009	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.149
Trinitrotoluene, 2,4,6-	118-96-7	0.158	mg/kg	0.316	U	ASH PIT 1-SB04	AP0013	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.158
Trinitrotoluene, 2,4,6-	118-96-7	0.1585	mg/kg	0.317	U	ASH PIT 1-SB05	AP0016	EXPLOSIVES	REG	9-Dec-08	8	9	U	0.159
Trinitrotoluene, 2,4,6-	118-96-7	0.138	mg/kg	0.276	UJ	ASH PIT 1-SB06	AP0019	EXPLOSIVES	REG	8-Dec-08	8	10	U	0.138
Trinitrotoluene, 2,4,6-	118-96-7	0.15	mg/kg	0.3	U	ASH PIT 1-SB08	AP0025	EXPLOSIVES	REG	9-Dec-08	8	10	U	0.15
Trinitrotoluene, 2,4,6-	118-96-7	0.1398	mg/kg	0.2795	UJUJ	ASH PIT 1-SB09	AP0058AP0028	EXPLOSIVES	AVGD	8-Dec-08	8	10	UU	0.14

Table E-2
Total Soil Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LAB_QUAL	METH_DET_LIM
Vanadium	7440-62-2	26.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Vanadium	7440-62-2	29.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Vanadium	7440-62-2	32.4	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Vanadium	7440-62-2	27.9	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Vanadium	7440-62-2	21.85	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		0.09535
Vanadium	7440-62-2	20.7	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Vanadium	7440-62-2	20.25	mg/kg	7.1		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5		7.1
Vanadium	7440-62-2	17.8	mg/kg	13.1		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		13.1
Vanadium	7440-62-2	39.2	mg/kg	8.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		8.4
Vanadium	7440-62-2	14.4	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Vanadium	7440-62-2	23	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Vanadium	7440-62-2	20.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Vanadium	7440-62-2	28.2	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Vanadium	7440-62-2	26.8	mg/kg	6.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		6.3
Vanadium	7440-62-2	20.6	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Vanadium	7440-62-2	15.1	mg/kg	0.196	J	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Vanadium	7440-62-2	24.05	mg/kg	0.1885	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		0.09425
Vanadium	7440-62-2	37.6	mg/kg	0.196	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Vanadium	7440-62-2	18.9	mg/kg	0.194	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Vanadium	7440-62-2	19.1	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Vanadium	7440-62-2	19.3	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Vanadium	7440-62-2	24.3	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Vanadium	7440-62-2	20.9	mg/kg	0.19	J	ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		0.0951
Vanadium	7440-62-2	20.3	mg/kg	0.182	J	ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		0.0911
Vanadium	7440-62-2	20.5	mg/kg	0.179	J	ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		0.0893
Vanadium	7440-62-2	29.3	mg/kg	0.19	J	ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		0.0948
Vanadium	7440-62-2	24.2	mg/kg	0.188	J	ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		0.094
Vanadium	7440-62-2	17	mg/kg	0.189	J	ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		0.0944
Vanadium	7440-62-2	25.3	mg/kg	0.193	J	ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		0.0965
Vanadium	7440-62-2	16.5	mg/kg	0.181	JJ	ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		0.0905
Zinc	7440-66-6	55.2	mg/kg	2.88		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.44
Zinc	7440-66-6	57.1	mg/kg	2.61		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.31
Zinc	7440-66-6	55.3	mg/kg	2.56		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.28
Zinc	7440-66-6	62.8	mg/kg	2.58		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.29
Zinc	7440-66-6	63.4	mg/kg	2.38		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	9-Dec-08	0	1		1.19
Zinc	7440-66-6	34.8	mg/kg	3.02		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.51
Zinc	7440-66-6	63.15	mg/kg	2.8		PBOW99-SBA101A	PBOW99SBA101APBOV	METALS	AVGD	11-Jun-99	0	0.5	MBDMBD	2.8
Zinc	7440-66-6	2.6	mg/kg	5.2	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	MBD	5.2
Zinc	7440-66-6	43.5	mg/kg	3.3		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	MBD	3.3
Zinc	7440-66-6	1.3	mg/kg	2.6	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	MBD	2.6
Zinc	7440-66-6	95.8	mg/kg	4.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	MBD	4.9
Zinc	7440-66-6	44.4	mg/kg	2.48		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.24
Zinc	7440-66-6	85.4	mg/kg	2.84		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.42
Zinc	7440-66-6	74.5	mg/kg	2.5		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	MBD	2.5
Zinc	7440-66-6	72.7	mg/kg	2.15		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		1.08
Zinc	7440-66-6	23.1	mg/kg	2.45		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.23
Zinc	7440-66-6	69.25	mg/kg	2.355		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	9-Dec-08	3	4		1.18
Zinc	7440-66-6	92.4	mg/kg	2.44		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		1.22
Zinc	7440-66-6	38.1	mg/kg	2.42		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		1.21
Zinc	7440-66-6	63.3	mg/kg	2.09		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		1.05
Zinc	7440-66-6	57.1	mg/kg	2.07		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		1.03
Zinc	7440-66-6	67.2	mg/kg	2.26		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		1.13
Zinc	7440-66-6	58.7	mg/kg	2.38		ASH PIT 1-SB01	AP0003	METALS	REG	8-Dec-08	8	10		1.19
Zinc	7440-66-6	55.4	mg/kg	2.28		ASH PIT 1-SB02	AP0006	METALS	REG	8-Dec-08	8	10		1.14
Zinc	7440-66-6	54.1	mg/kg	2.23		ASH PIT 1-SB03	AP0009	METALS	REG	9-Dec-08	8	10		1.12
Zinc	7440-66-6	87	mg/kg	2.37		ASH PIT 1-SB04	AP0013	METALS	REG	9-Dec-08	8	10		1.19
Zinc	7440-66-6	65.4	mg/kg	2.35		ASH PIT 1-SB05	AP0016	METALS	REG	9-Dec-08	8	9		1.17
Zinc	7440-66-6	78	mg/kg	2.36		ASH PIT 1-SB06	AP0019	METALS	REG	8-Dec-08	8	10		1.18
Zinc	7440-66-6	63.6	mg/kg	2.41		ASH PIT 1-SB08	AP0025	METALS	REG	9-Dec-08	8	10		1.21
Zinc	7440-66-6	75.5	mg/kg	2.265		ASH PIT 1-SB09	AP0058AP0028	METALS	AVGD	8-Dec-08	8	10		1.13

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.049	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.096	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.048	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.05	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.075	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.15	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.074	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.076	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.098	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.049	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.05	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.064	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.13	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.062	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.064	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.2	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.18	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.089	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.092	N	U	EXPLOSIVES
HMX	2691-41-0	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.21	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.1	N	U	EXPLOSIVES
HMX	2691-41-0	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.11	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.049	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.096	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.048	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.05	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.063	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.12	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.062	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.063	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.095	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.19	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.093	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.096	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.075	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.15	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.075	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.073	N	U	EXPLOSIVES
RDX	121-82-4	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.074	N	U	EXPLOSIVES
RDX	121-82-4	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.14	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.072	N	U	EXPLOSIVES
RDX	121-82-4	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.074	N	U	EXPLOSIVES
Tetryl	479-45-8	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.076	N	U	EXPLOSIVES
Tetryl	479-45-8	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.15	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.075	N	U	EXPLOSIVES
Tetryl	479-45-8	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.077	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.049	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.096	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.048	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.05	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.2	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.068	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.19	ug/L	0.38	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.13	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.066	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.2	UJ	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.068	N	U	EXPLOSIVES
Chloride	16887-00-6	3E+06	ug/L	200000		AP1-BEDGW-001	AP3053	REG	9-May-09	100000	N		GEN CHEMISTRY
Chloride	16887-00-6	4E+06	ug/L	200000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	100000	N		GEN CHEMISTRY
Chloride	16887-00-6	705000	ug/L	100000		AP1-BEDGW-002	AP3054	REG	10-May-09	50000	N		GEN CHEMISTRY
Chloride	16887-00-6	2E+06	ug/L	100000	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	50000	N		GEN CHEMISTRY
Cyanide, total	57-12-5	37	ug/L	10	J	AP1-BEDGW-001	AP3053	REG	9-May-09	5	N		GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5	N	U	GEN CHEMISTRY

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Cyanide, total	57-12-5	120	ug/L	10	J	AP1-BEDGW-002	AP3054	REG	10-May-09	5	N		GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	5	N	U	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	46	ug/L	100	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	30	N	B	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	1000	ug/L	2000	U	AP1-BEDGW-001	AP3053	REG	9-May-09	740	N	U	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	190	ug/L	100	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	30	N		GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	1000	ug/L	2000	U	AP1-BEDGW-002	AP3054	REG	10-May-09	740	N	U	GEN CHEMISTRY
Sulfate	14808-79-8	13600	ug/L	2000		AP1-BEDGW-001	AP3053	REG	9-May-09	1000	N		GEN CHEMISTRY
Sulfate	14808-79-8	25000	ug/L	50000	UJ	AP1-BEDGW-001	AP3073	REG	6-Nov-09	25000	N	U	GEN CHEMISTRY
Sulfate	14808-79-8	93400	ug/L	2000		AP1-BEDGW-002	AP3054	REG	10-May-09	1000	N		GEN CHEMISTRY
Sulfate	14808-79-8	50000	ug/L	100000	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	50000	N	U	GEN CHEMISTRY
Aluminum - f	7429-90-5	23.2	ug/L	200	J	AP1-BEDGW-001	AP3053	REG	9-May-09	11	Y	B	METALS
Aluminum - f	7429-90-5	26.1	ug/L	200	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	11	Y	B	METALS
Aluminum - f	7429-90-5	409	ug/L	200		AP1-BEDGW-002	AP3054	REG	10-May-09	11	Y		METALS
Aluminum - f	7429-90-5	24.8	ug/L	200	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	11	Y	B	METALS
Aluminum - uf	7429-90-5	57.2	ug/L	200	J	AP1-BEDGW-001	AP3053	REG	9-May-09	11	N	B	METALS
Aluminum - uf	7429-90-5	45.3	ug/L	200	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	11	N	B	METALS
Aluminum - uf	7429-90-5	67.5	ug/L	200	J	AP1-BEDGW-002	AP3054	REG	10-May-09	11	N	B	METALS
Aluminum - uf	7429-90-5	46.7	ug/L	200	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	11	N	B	METALS
Antimony - f	7440-36-0	6	ug/L	12	U	AP1-BEDGW-001	AP3053	REG	9-May-09	9	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	5.4	ug/L	6	J	AP1-BEDGW-002	AP3054	REG	10-May-09	4.5	Y	B	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	4.5	Y	U	METALS
Antimony - uf	7440-36-0	6	ug/L	12	U	AP1-BEDGW-001	AP3053	REG	9-May-09	9	N	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.5	N	U	METALS
Antimony - uf	7440-36-0	5.8	ug/L	6	J	AP1-BEDGW-002	AP3054	REG	10-May-09	4.5	N	B	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	4.5	N	U	METALS
Arsenic - f	7440-38-2	65.6	ug/L	20		AP1-BEDGW-001	AP3053	REG	9-May-09	7.2	Y		METALS
Arsenic - f	7440-38-2	133	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.2	Y		METALS
Arsenic - f	7440-38-2	77.7	ug/L	10		AP1-BEDGW-002	AP3054	REG	10-May-09	3.6	Y		METALS
Arsenic - f	7440-38-2	36.7	ug/L	10		AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.6	Y		METALS
Arsenic - uf	7440-38-2	69.7	ug/L	20		AP1-BEDGW-001	AP3053	REG	9-May-09	7.2	N		METALS
Arsenic - uf	7440-38-2	110	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.2	N		METALS
Arsenic - uf	7440-38-2	101	ug/L	10		AP1-BEDGW-002	AP3054	REG	10-May-09	3.6	N		METALS
Arsenic - uf	7440-38-2	50.7	ug/L	10		AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.6	N		METALS
Barium - f	7440-39-3	813	ug/L	200		AP1-BEDGW-001	AP3053	REG	9-May-09	5	Y		METALS
Barium - f	7440-39-3	961	ug/L	200		AP1-BEDGW-001	AP3073	REG	6-Nov-09	5	Y		METALS
Barium - f	7440-39-3	307	ug/L	200		AP1-BEDGW-002	AP3054	REG	10-May-09	5	Y		METALS
Barium - f	7440-39-3	406	ug/L	200		AP1-BEDGW-002	AP3074	REG	10-Nov-09	5	Y		METALS
Barium - uf	7440-39-3	897	ug/L	200		AP1-BEDGW-001	AP3053	REG	9-May-09	5	N		METALS
Barium - uf	7440-39-3	989	ug/L	200		AP1-BEDGW-001	AP3073	REG	6-Nov-09	5	N		METALS
Barium - uf	7440-39-3	555	ug/L	200		AP1-BEDGW-002	AP3054	REG	10-May-09	5	N		METALS
Barium - uf	7440-39-3	434	ug/L	200		AP1-BEDGW-002	AP3074	REG	10-Nov-09	5	N		METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1	Y	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1	N	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1	Y	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1	N	U	METALS
Calcium - f	7440-70-2	521000	ug/L	2000		AP1-BEDGW-001	AP3053	REG	9-May-09	200	Y		METALS
Calcium - f	7440-70-2	596000	ug/L	2000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	200	Y		METALS
Calcium - f	7440-70-2	153000	ug/L	1000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	Y		METALS
Calcium - f	7440-70-2	200000	ug/L	1000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	100	Y		METALS

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Calcium - uf	7440-70-2	573000	ug/L	2000		AP1-BEDGW-001	AP3053	REG	9-May-09	200	N		METALS
Calcium - uf	7440-70-2	590000	ug/L	2000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	200	N		METALS
Calcium - uf	7440-70-2	246000	ug/L	1000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	N		METALS
Calcium - uf	7440-70-2	220000	ug/L	1000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	100	N		METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.6	Y	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.6	N	U	METALS
Cobalt - f	7440-48-4	25	ug/L	50	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.83	Y	U	METALS
Cobalt - f	7440-48-4	25	ug/L	50	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.83	Y	U	METALS
Cobalt - f	7440-48-4	25	ug/L	50	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.83	Y	U	METALS
Cobalt - f	7440-48-4	25	ug/L	50	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.83	Y	U	METALS
Cobalt - uf	7440-48-4	25	ug/L	50	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.83	N	U	METALS
Cobalt - uf	7440-48-4	25	ug/L	50	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.83	N	U	METALS
Cobalt - uf	7440-48-4	25	ug/L	50	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.83	N	U	METALS
Cobalt - uf	7440-48-4	25	ug/L	50	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.83	N	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	Y	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	2.1	Y	U	METALS
Copper - f	7440-50-8	43.1	ug/L	25		AP1-BEDGW-002	AP3054	REG	10-May-09	2.1	Y		METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.1	Y	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-002	AP3054	REG	10-May-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.1	N	U	METALS
Iron - f	7439-89-6	77.4	ug/L	300	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	23	Y	B	METALS
Iron - f	7439-89-6	150	ug/L	300	U	AP1-BEDGW-001	AP3053	REG	9-May-09	23	Y	U	METALS
Iron - f	7439-89-6	124	ug/L	300	J	AP1-BEDGW-002	AP3054	REG	10-May-09	23	Y	B	METALS
Iron - f	7439-89-6	150	ug/L	300	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	23	Y	U	METALS
Iron - uf	7439-89-6	4910	ug/L	300		AP1-BEDGW-001	AP3053	REG	9-May-09	23	N		METALS
Iron - uf	7439-89-6	1570	ug/L	300		AP1-BEDGW-001	AP3073	REG	6-Nov-09	23	N		METALS
Iron - uf	7439-89-6	322	ug/L	300		AP1-BEDGW-002	AP3054	REG	10-May-09	23	N		METALS
Iron - uf	7439-89-6	335	ug/L	300	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	23	N		METALS
Lead - f	7439-92-1	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	4	Y	U	METALS
Lead - f	7439-92-1	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	Y	U	METALS
Lead - f	7439-92-1	7.5	ug/L	10	J	AP1-BEDGW-002	AP3054	REG	10-May-09	2	Y	B	METALS
Lead - f	7439-92-1	2.5	ug/L	5	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2	Y	U	METALS
Lead - uf	7439-92-1	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	4	N	U	METALS
Lead - uf	7439-92-1	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	METALS
Lead - uf	7439-92-1	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	2	N	U	METALS
Lead - uf	7439-92-1	2.5	ug/L	5	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2	N	U	METALS
Magnesium - f	7439-95-4	427000	ug/L	5000		AP1-BEDGW-001	AP3053	REG	9-May-09	100	Y		METALS
Magnesium - f	7439-95-4	471000	ug/L	5000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	100	Y		METALS
Magnesium - f	7439-95-4	96800	ug/L	5000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	Y		METALS
Magnesium - f	7439-95-4	148000	ug/L	5000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	100	Y		METALS
Magnesium - uf	7439-95-4	418000	ug/L	5000		AP1-BEDGW-001	AP3053	REG	9-May-09	100	N		METALS
Magnesium - uf	7439-95-4	479000	ug/L	5000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	100	N		METALS
Magnesium - uf	7439-95-4	155000	ug/L	5000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	N		METALS
Magnesium - uf	7439-95-4	155000	ug/L	5000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	100	N		METALS
Manganese - f	7439-96-5	804	ug/L	15		AP1-BEDGW-001	AP3053	REG	9-May-09	0.5	Y		METALS
Manganese - f	7439-96-5	658	ug/L	15		AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.5	Y		METALS
Manganese - f	7439-96-5	379	ug/L	15		AP1-BEDGW-002	AP3054	REG	10-May-09	0.5	Y		METALS
Manganese - f	7439-96-5	10.5	ug/L	15	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.5	Y	B	METALS
Manganese - uf	7439-96-5	857	ug/L	15		AP1-BEDGW-001	AP3053	REG	9-May-09	0.5	N		METALS
Manganese - uf	7439-96-5	704	ug/L	15		AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.5	N		METALS
Manganese - uf	7439-96-5	548	ug/L	15		AP1-BEDGW-002	AP3054	REG	10-May-09	0.5	N		METALS
Manganese - uf	7439-96-5	38	ug/L	15		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.5	N		METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.14	Y	U	METALS

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.14	Y	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-001	AP3053	REG	9-May-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.14	N	U	METALS
Nickel - f	7440-02-0	3.8	ug/L	40	J	AP1-BEDGW-001	AP3053	REG	9-May-09	2.3	Y	B	METALS
Nickel - f	7440-02-0	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	2.3	Y	U	METALS
Nickel - f	7440-02-0	55.2	ug/L	40		AP1-BEDGW-002	AP3054	REG	10-May-09	2.3	Y		METALS
Nickel - f	7440-02-0	20	ug/L	40	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.3	Y	U	METALS
Nickel - uf	7440-02-0	5.8	ug/L	40	J	AP1-BEDGW-001	AP3053	REG	9-May-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	2.8	ug/L	40	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	20	ug/L	40	U	AP1-BEDGW-002	AP3054	REG	10-May-09	2.3	N	U	METALS
Nickel - uf	7440-02-0	20	ug/L	40	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.3	N	U	METALS
Potassium - f	7440-09-7	107000	ug/L	20000		AP1-BEDGW-001	AP3053	REG	9-May-09	200	Y		METALS
Potassium - f	7440-09-7	131000	ug/L	20000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	200	Y		METALS
Potassium - f	7440-09-7	45300	ug/L	10000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	Y		METALS
Potassium - f	7440-09-7	84800	ug/L	20000	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	200	Y		METALS
Potassium - uf	7440-09-7	110000	ug/L	20000		AP1-BEDGW-001	AP3053	REG	9-May-09	200	N		METALS
Potassium - uf	7440-09-7	129000	ug/L	20000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	200	N		METALS
Potassium - uf	7440-09-7	59600	ug/L	10000		AP1-BEDGW-002	AP3054	REG	10-May-09	100	N		METALS
Potassium - uf	7440-09-7	88800	ug/L	20000	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	200	N		METALS
Selenium - f	7782-49-2	16.7	ug/L	20	J	AP1-BEDGW-001	AP3053	REG	9-May-09	6.2	Y	B	METALS
Selenium - f	7782-49-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.2	Y	U	METALS
Selenium - f	7782-49-2	15	ug/L	20	J	AP1-BEDGW-002	AP3054	REG	10-May-09	3.1	Y	B	METALS
Selenium - f	7782-49-2	4	ug/L	10	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.1	Y	B	METALS
Selenium - uf	7782-49-2	11.9	ug/L	20	J	AP1-BEDGW-001	AP3053	REG	9-May-09	6.2	N	B	METALS
Selenium - uf	7782-49-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.2	N	U	METALS
Selenium - uf	7782-49-2	6.3	ug/L	20	J	AP1-BEDGW-002	AP3054	REG	10-May-09	3.1	N	B	METALS
Selenium - uf	7782-49-2	5.2	ug/L	10	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.1	N	B	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.2	Y	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.2	N	U	METALS
Sodium - f	7440-23-5	1E+06	ug/L	200000		AP1-BEDGW-001	AP3053	REG	9-May-09	10000	Y		METALS
Sodium - f	7440-23-5	1E+06	ug/L	500000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	25000	Y		METALS
Sodium - f	7440-23-5	644000	ug/L	100000		AP1-BEDGW-002	AP3054	REG	10-May-09	5000	Y		METALS
Sodium - f	7440-23-5	833000	ug/L	200000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	10000	Y		METALS
Sodium - uf	7440-23-5	1E+06	ug/L	200000		AP1-BEDGW-001	AP3053	REG	9-May-09	10000	N		METALS
Sodium - uf	7440-23-5	1E+06	ug/L	500000		AP1-BEDGW-001	AP3073	REG	6-Nov-09	25000	N		METALS
Sodium - uf	7440-23-5	573000	ug/L	100000		AP1-BEDGW-002	AP3054	REG	10-May-09	5000	N		METALS
Sodium - uf	7440-23-5	889000	ug/L	200000		AP1-BEDGW-002	AP3074	REG	10-Nov-09	10000	N		METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.4	Y	U	METALS
Thallium - uf	7440-28-0	5.3	ug/L	10	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.4	N	B	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.4	N	U	METALS
Vanadium - f	7440-62-2	2	ug/L	50	J	AP1-BEDGW-001	AP3053	REG	9-May-09	0.66	Y	B	METALS
Vanadium - f	7440-62-2	25	ug/L	50	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.66	Y	U	METALS
Vanadium - f	7440-62-2	3.1	ug/L	50	J	AP1-BEDGW-002	AP3054	REG	10-May-09	0.66	Y	B	METALS
Vanadium - f	7440-62-2	25	ug/L	50	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.66	Y	U	METALS
Vanadium - uf	7440-62-2	2.2	ug/L	50	J	AP1-BEDGW-001	AP3053	REG	9-May-09	0.66	N	B	METALS
Vanadium - uf	7440-62-2	25	ug/L	50	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	0.66	N	U	METALS
Vanadium - uf	7440-62-2	2.6	ug/L	50	J	AP1-BEDGW-002	AP3054	REG	10-May-09	0.66	N	B	METALS
Vanadium - uf	7440-62-2	1.3	ug/L	50	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.66	N	B	METALS

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Zinc - f	7440-66-6	8.3	ug/L	20	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	Y	B	METALS
Zinc - f	7440-66-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	3.8	Y	U	METALS
Zinc - f	7440-66-6	140	ug/L	20		AP1-BEDGW-002	AP3054	REG	10-May-09	3.8	Y		METALS
Zinc - f	7440-66-6	10	ug/L	20	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.8	Y	U	METALS
Zinc - uf	7440-66-6	11.5	ug/L	20	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	B	METALS
Zinc - uf	7440-66-6	16	ug/L	20	J	AP1-BEDGW-002	AP3054	REG	10-May-09	3.8	N	B	METALS
Zinc - uf	7440-66-6	7.7	ug/L	20	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.8	N	B	METALS
3-Methylphenol and 4-Methylphenol	65794-96-9	9	ug/L	19	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	J	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	8	ug/L	20	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	J	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	0.97	ug/L	4.9	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	J	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Anthracene	120-12-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Anthracene	120-12-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	48	ug/L	96	U	AP1-BEDGW-001	AP3053	REG	9-May-09	38	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	49.5	ug/L	99	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12	ug/L	24	U	AP1-BEDGW-002	AP3054	REG	10-May-09	9.5	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12	ug/L	24	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	9.7	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Bis(2-chloroisopropyl)ether	108-60-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Carbazole	86-74-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Carbazole	86-74-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	4.6	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.8	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.1	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.2	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Chrysene	218-01-9	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Chrysene	218-01-9	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	19	ug/L	38	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Dichlorobenzidine, 3,3'-	91-94-1	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	4.75	ug/L	9.5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	4.85	ug/L	9.7	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.1	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.3	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	24.7	ug/L	19		AP1-BEDGW-001	AP3053	REG	9-May-09	4.6	N		SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	20.7	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.8	N		SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2	ug/L	4.8	J	AP1-BEDGW-002	AP3054	REG	10-May-09	1.1	N	J	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.8	ug/L	4.9	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.2	N	J	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	19	ug/L	38	U	AP1-BEDGW-001	AP3053	REG	9-May-09	15	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	16	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	4.75	ug/L	9.5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	3.8	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	4.85	ug/L	9.7	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	3.9	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	48	ug/L	96	U	AP1-BEDGW-001	AP3053	REG	9-May-09	38	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	49.5	ug/L	99	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12	ug/L	24	U	AP1-BEDGW-002	AP3054	REG	10-May-09	9.5	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12	ug/L	24	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	9.7	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5.8	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.9	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.4	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.5	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Fluorene	86-73-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Fluorene	86-73-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	9.6	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	9.9	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	2.4	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.4	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.1	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	N	U	SEMIVOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Hexachlorocyclopentadiene	77-47-4	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.3	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	9.6	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	9.9	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	2.4	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.4	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	4.2	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.4	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.1	N	U	SEMIVOLATILES
Isophorone	78-59-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Isophorone	78-59-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	36.2	ug/L	19		AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N		SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	32.7	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N		SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	14.5	ug/L	4.8		AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N		SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	14.5	ug/L	4.9		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N		SEMIVOLATILES
Methylphenol, 2-	95-48-7	6.9	ug/L	19	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	J	SEMIVOLATILES
Methylphenol, 2-	95-48-7	6.2	ug/L	20	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	J	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Naphthalene	91-20-3	33	ug/L	19		AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N		SEMIVOLATILES
Naphthalene	91-20-3	33.2	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N		SEMIVOLATILES
Naphthalene	91-20-3	11.8	ug/L	4.8		AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N		SEMIVOLATILES
Naphthalene	91-20-3	15.3	ug/L	4.9		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N		SEMIVOLATILES
Nitroaniline, 2-	88-74-4	19	ug/L	38	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	4.75	ug/L	9.5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	4.85	ug/L	9.7	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	19	ug/L	38	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	4.75	ug/L	9.5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	4.85	ug/L	9.7	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	19	ug/L	38	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	4.75	ug/L	9.5	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	4.85	ug/L	9.7	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.1	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	48	ug/L	96	U	AP1-BEDGW-001	AP3053	REG	9-May-09	38	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	49.5	ug/L	99	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12	ug/L	24	U	AP1-BEDGW-002	AP3054	REG	10-May-09	9.5	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12	ug/L	24	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	9.7	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.7	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.9	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.9	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.9	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	48	ug/L	96	U	AP1-BEDGW-001	AP3053	REG	9-May-09	38	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	49.5	ug/L	99	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12	ug/L	24	U	AP1-BEDGW-002	AP3054	REG	10-May-09	9.5	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12	ug/L	24	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	9.7	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Phenanthrene	85-01-8	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Phenol	108-95-2	6.6	ug/L	19	J	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	J	SEMIVOLATILES
Phenol	108-95-2	6.6	ug/L	20	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	J	SEMIVOLATILES
Phenol	108-95-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Phenol	108-95-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Pyrene	129-00-0	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Pyrene	129-00-0	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.8	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.95	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.97	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.5	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	9.5	ug/L	19	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.5	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.4	ug/L	4.8	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.45	ug/L	4.9	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.4	N	U	SEMIVOLATILES
Acetone	67-64-1	140	ug/L	250	J	AP1-BEDGW-001	AP3053	REG	9-May-09	100	N	J	VOLATILES
Acetone	67-64-1	463	ug/L	500	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	200	N	J	VOLATILES
Benzene	71-43-2	613	ug/L	10		AP1-BEDGW-001	AP3053	REG	9-May-09	4	N		VOLATILES
Benzene	71-43-2	1300	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	8	N		VOLATILES
Benzene	71-43-2	67.1	ug/L	2		AP1-BEDGW-002	AP3054	REG	10-May-09	0.8	N		VOLATILES
Benzene	71-43-2	27.5	ug/L	2		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.8	N		VOLATILES
Bromodichloromethane	75-27-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2	N	U	VOLATILES
Bromodichloromethane	75-27-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	VOLATILES
Bromodichloromethane	75-27-4	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.4	N	U	VOLATILES
Bromodichloromethane	75-27-4	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.4	N	U	VOLATILES
Bromoform	75-25-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.6	N	U	VOLATILES
Bromoform	75-25-2	5	ug/L	10	UJ	AP1-BEDGW-001	AP3053	REG	9-May-09	3.3	N	U	VOLATILES
Bromoform	75-25-2	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.66	N	U	VOLATILES
Bromoform	75-25-2	1	ug/L	2	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.66	N	U	VOLATILES
Bromomethane	74-83-9	10	ug/L	20	U	AP1-BEDGW-001	AP3053	REG	9-May-09	7.8	N	U	VOLATILES
Bromomethane	74-83-9	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	16	N	U	VOLATILES
Bromomethane	74-83-9	2	ug/L	4	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.6	N	U	VOLATILES
Bromomethane	74-83-9	2	ug/L	4	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.6	N	U	VOLATILES
Butanone, 2-	78-93-3	71.5	ug/L	50		AP1-BEDGW-001	AP3053	REG	9-May-09	20	N		VOLATILES
Butanone, 2-	78-93-3	299	ug/L	100		AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N		VOLATILES
Butanone, 2-	78-93-3	10.9	ug/L	10		AP1-BEDGW-002	AP3054	REG	10-May-09	4	N		VOLATILES
Butanone, 2-	78-93-3	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	4	N	U	VOLATILES
Carbon disulfide	75-15-0	12.3	ug/L	20	J	AP1-BEDGW-001	AP3053	REG	9-May-09	4	N	JB	VOLATILES
Carbon disulfide	75-15-0	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	8	N	U	VOLATILES
Carbon disulfide	75-15-0	3	ug/L	4	J	AP1-BEDGW-002	AP3054	REG	10-May-09	0.8	N	JB	VOLATILES
Carbon disulfide	75-15-0	1.9	ug/L	4	J	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.8	N	J	VOLATILES
Carbon tetrachloride	56-23-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.2	N	U	VOLATILES
Carbon tetrachloride	56-23-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.4	N	U	VOLATILES
Carbon tetrachloride	56-23-5	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.44	N	U	VOLATILES
Carbon tetrachloride	56-23-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.44	N	U	VOLATILES
Chlorobenzene	108-90-7	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.2	N	U	VOLATILES
Chlorobenzene	108-90-7	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.4	N	U	VOLATILES
Chlorobenzene	108-90-7	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.44	N	U	VOLATILES
Chlorobenzene	108-90-7	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.44	N	U	VOLATILES
Chloroethane	75-00-3	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	9.6	N	U	VOLATILES
Chloroethane	75-00-3	10	ug/L	20	UJ	AP1-BEDGW-001	AP3053	REG	9-May-09	4.8	N	U	VOLATILES
Chloroethane	75-00-3	2	ug/L	4	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.96	N	U	VOLATILES
Chloroethane	75-00-3	2	ug/L	4	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.96	N	U	VOLATILES
Chloroform	67-66-3	18	ug/L	10		AP1-BEDGW-001	AP3053	REG	9-May-09	2.8	N		VOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Chloroform	67-66-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.6	N	U	VOLATILES
Chloroform	67-66-3	12	ug/L	2		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.56	N		VOLATILES
Chloroform	67-66-3	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.56	N	U	VOLATILES
Chloromethane	74-87-3	10	ug/L	20	U	AP1-BEDGW-001	AP3053	REG	9-May-09	6.1	N	U	VOLATILES
Chloromethane	74-87-3	20	ug/L	40	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	12	N	U	VOLATILES
Chloromethane	74-87-3	216	ug/L	40		AP1-BEDGW-002	AP3074	REG	10-Nov-09	12	N		VOLATILES
Chloromethane	74-87-3	2	ug/L	4	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.2	N	U	VOLATILES
Dibromochloromethane	124-48-1	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2	N	U	VOLATILES
Dibromochloromethane	124-48-1	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	VOLATILES
Dibromochloromethane	124-48-1	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.4	N	U	VOLATILES
Dibromochloromethane	124-48-1	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.4	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.4	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.8	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.48	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.48	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.4	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.8	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.68	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.68	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	5.4	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	11	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	1.1	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	1.1	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.4	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.4	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	4.5	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	9	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.9	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.9	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.2	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.42	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.42	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.2	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.42	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.42	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.2	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	5	ug/L	10	UJ	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.42	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.42	N	U	VOLATILES
Ethylbenzene	100-41-4	126	ug/L	10		AP1-BEDGW-001	AP3053	REG	9-May-09	4.3	N		VOLATILES
Ethylbenzene	100-41-4	176	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	8.6	N		VOLATILES
Ethylbenzene	100-41-4	45.6	ug/L	2		AP1-BEDGW-002	AP3054	REG	10-May-09	0.86	N		VOLATILES
Ethylbenzene	100-41-4	30.9	ug/L	2		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.86	N		VOLATILES
Hexanone, 2-	591-78-6	50	ug/L	100	U	AP1-BEDGW-001	AP3053	REG	9-May-09	50	N	U	VOLATILES
Hexanone, 2-	591-78-6	100	ug/L	200	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	100	N	U	VOLATILES
Hexanone, 2-	591-78-6	10	ug/L	20	U	AP1-BEDGW-002	AP3054	REG	10-May-09	10	N	U	VOLATILES
Hexanone, 2-	591-78-6	10	ug/L	20	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	10	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	25	ug/L	50	U	AP1-BEDGW-001	AP3053	REG	9-May-09	20	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	50	ug/L	100	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	40	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	5	ug/L	10	U	AP1-BEDGW-002	AP3054	REG	10-May-09	4	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	4	N	U	VOLATILES
Methylene chloride	75-09-2	28.8	ug/L	100	J	AP1-BEDGW-001	AP3073	REG	6-Nov-09	20	N	J	VOLATILES
Methylene chloride	75-09-2	5	ug/L	10	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	2	N	U	VOLATILES
Styrene	100-42-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	7.2	N	U	VOLATILES
Styrene	100-42-5	5	ug/L	10	UJ	AP1-BEDGW-001	AP3053	REG	9-May-09	3.6	N	U	VOLATILES
Styrene	100-42-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.72	N	U	VOLATILES
Styrene	100-42-5	1	ug/L	2	UJ	AP1-BEDGW-002	AP3054	REG	10-May-09	0.72	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.1	N	U	VOLATILES

Table E-3
Bedrock Groundwater Analytical Data Used In Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Tetrachloroethane, 1,1,2,2-	79-34-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.2	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.53	ug/L	2	J	AP1-BEDGW-002	AP3054	REG	10-May-09	0.42	N	J	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.42	N	U	VOLATILES
Tetrachloroethene	127-18-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.2	N	U	VOLATILES
Tetrachloroethene	127-18-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	4.4	N	U	VOLATILES
Tetrachloroethene	127-18-4	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.44	N	U	VOLATILES
Tetrachloroethene	127-18-4	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.44	N	U	VOLATILES
Toluene	108-88-3	490	ug/L	10		AP1-BEDGW-001	AP3053	REG	9-May-09	3.5	N		VOLATILES
Toluene	108-88-3	730	ug/L	20		AP1-BEDGW-001	AP3073	REG	6-Nov-09	7	N		VOLATILES
Toluene	108-88-3	69.2	ug/L	2		AP1-BEDGW-002	AP3054	REG	10-May-09	0.7	N		VOLATILES
Toluene	108-88-3	43.6	ug/L	2		AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.7	N		VOLATILES
Trichloroethane, 1,1,1-	71-55-6	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.3	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.6	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.66	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.66	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	2.6	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	5.2	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.52	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.52	N	U	VOLATILES
Trichloroethene	79-01-6	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3.2	N	U	VOLATILES
Trichloroethene	79-01-6	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6.4	N	U	VOLATILES
Trichloroethene	79-01-6	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.64	N	U	VOLATILES
Trichloroethene	79-01-6	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.64	N	U	VOLATILES
Vinyl chloride	75-01-4	5	ug/L	10	U	AP1-BEDGW-001	AP3053	REG	9-May-09	3	N	U	VOLATILES
Vinyl chloride	75-01-4	10	ug/L	20	U	AP1-BEDGW-001	AP3073	REG	6-Nov-09	6	N	U	VOLATILES
Vinyl chloride	75-01-4	1	ug/L	2	U	AP1-BEDGW-002	AP3054	REG	10-May-09	0.6	N	U	VOLATILES
Vinyl chloride	75-01-4	1	ug/L	2	U	AP1-BEDGW-002	AP3074	REG	10-Nov-09	0.6	N	U	VOLATILES
Xylenes, total	1330-20-7	1060	ug/L	30		AP1-BEDGW-001	AP3053	REG	9-May-09	12	N		VOLATILES
Xylenes, total	1330-20-7	1340	ug/L	60		AP1-BEDGW-001	AP3073	REG	6-Nov-09	23	N		VOLATILES
Xylenes, total	1330-20-7	473	ug/L	6		AP1-BEDGW-002	AP3054	REG	10-May-09	2.3	N		VOLATILES
Xylenes, total	1330-20-7	370	ug/L	6		AP1-BEDGW-002	AP3074	REG	10-Nov-09	2.3	N		VOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
3-Methylphenol and 4-Methylphenol	65794-96-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Acetone	67-64-1	12.5	ug/L	25	U	AP1-MW01	AP3050	REG	7-May-09	10	N	U	VOLATILES
Acetone	67-64-1	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	10	N	U	VOLATILES
Acetone	67-64-1	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	10	N	U	VOLATILES
Aluminum - f	7429-90-5	100	ug/L	200	U	AP1-MW01	AP3050	REG	7-May-09	11	Y	U	METALS
Aluminum - f	7429-90-5	100	ug/L	200	U	AP1-MW01	AP3070	REG	4-Nov-09	11	Y	U	METALS
Aluminum - f	7429-90-5	15.5	ug/L	200	J	AP1-MW02	AP3051	REG	10-May-09	11	Y	B	METALS
Aluminum - f	7429-90-5	12.8	ug/L	200	J	AP1-MW02	AP3071	REG	6-Nov-09	11	Y	B	METALS
Aluminum - f	7429-90-5	19.1	ug/L	200	J	AP1-MW03	AP3052	REG	11-May-09	11	Y	B	METALS
Aluminum - f	7429-90-5	3320	ug/L	200		AP1-MW03	AP3072	REG	6-Nov-09	11	Y		METALS
Aluminum - uf	7429-90-5	26.1	ug/L	200	J	AP1-MW01	AP3050	REG	7-May-09	11	N	B	METALS
Aluminum - uf	7429-90-5	191	ug/L	200	J	AP1-MW01	AP3070	REG	4-Nov-09	11	N	B	METALS
Aluminum - uf	7429-90-5	76.8	ug/L	200	J	AP1-MW02	AP3051	REG	10-May-09	11	N	B	METALS
Aluminum - uf	7429-90-5	68.7	ug/L	200	J	AP1-MW02	AP3071	REG	6-Nov-09	11	N	B	METALS
Aluminum - uf	7429-90-5	1110	ug/L	200	J	AP1-MW03	AP3052	REG	11-May-09	11	N		METALS
Aluminum - uf	7429-90-5	17.2	ug/L	200	J	AP1-MW03	AP3072	REG	6-Nov-09	11	N	B	METALS
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.049	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.049	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.049	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.05	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.049	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.049	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.075	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.075	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.075	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.076	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.075	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.075	N	U	EXPLOSIVES
Anthracene	120-12-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW01	AP3050	REG	7-May-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW01	AP3070	REG	4-Nov-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW02	AP3051	REG	10-May-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW02	AP3071	REG	6-Nov-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW03	AP3052	REG	11-May-09	4.5	Y	U	METALS
Antimony - f	7440-36-0	3	ug/L	6	U	AP1-MW03	AP3072	REG	6-Nov-09	4.5	Y	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW01	AP3050	REG	7-May-09	4.5	N	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW01	AP3070	REG	4-Nov-09	4.5	N	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW02	AP3051	REG	10-May-09	4.5	N	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW02	AP3071	REG	6-Nov-09	4.5	N	U	METALS
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW03	AP3052	REG	11-May-09	4.5	N	U	METALS

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Antimony - uf	7440-36-0	3	ug/L	6	U	AP1-MW03	AP3072	REG	6-Nov-09	4.5	N	U	METALS
Arsenic - f	7440-38-2	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	3.6	Y	U	METALS
Arsenic - f	7440-38-2	6.2	ug/L	10	J	AP1-MW01	AP3070	REG	4-Nov-09	3.6	Y	B	METALS
Arsenic - f	7440-38-2	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	3.6	Y	U	METALS
Arsenic - f	7440-38-2	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	3.6	Y	U	METALS
Arsenic - f	7440-38-2	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	3.6	Y	U	METALS
Arsenic - f	7440-38-2	5.7	ug/L	10	J	AP1-MW03	AP3072	REG	6-Nov-09	3.6	Y	B	METALS
Arsenic - uf	7440-38-2	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	3.6	N	U	METALS
Arsenic - uf	7440-38-2	5.4	ug/L	10	J	AP1-MW01	AP3070	REG	4-Nov-09	3.6	N	B	METALS
Arsenic - uf	7440-38-2	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	3.6	N	U	METALS
Arsenic - uf	7440-38-2	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	3.6	N	U	METALS
Arsenic - uf	7440-38-2	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	3.6	N	U	METALS
Arsenic - uf	7440-38-2	6.3	ug/L	10	J	AP1-MW03	AP3072	REG	6-Nov-09	3.6	N	B	METALS
Barium - f	7440-39-3	28.4	ug/L	200	J	AP1-MW01	AP3050	REG	7-May-09	5	Y	B	METALS
Barium - f	7440-39-3	34.9	ug/L	200	J	AP1-MW01	AP3070	REG	4-Nov-09	5	Y	B	METALS
Barium - f	7440-39-3	61.7	ug/L	200	J	AP1-MW02	AP3051	REG	10-May-09	5	Y	B	METALS
Barium - f	7440-39-3	51.6	ug/L	200	J	AP1-MW02	AP3071	REG	6-Nov-09	5	Y	B	METALS
Barium - f	7440-39-3	255	ug/L	200		AP1-MW03	AP3052	REG	11-May-09	5	Y		METALS
Barium - f	7440-39-3	177	ug/L	200	J	AP1-MW03	AP3072	REG	6-Nov-09	5	Y	B	METALS
Barium - uf	7440-39-3	28.6	ug/L	200	J	AP1-MW01	AP3050	REG	7-May-09	5	N	B	METALS
Barium - uf	7440-39-3	37.8	ug/L	200	J	AP1-MW01	AP3070	REG	4-Nov-09	5	N	B	METALS
Barium - uf	7440-39-3	61	ug/L	200	J	AP1-MW02	AP3051	REG	10-May-09	5	N	B	METALS
Barium - uf	7440-39-3	53.1	ug/L	200	J	AP1-MW02	AP3071	REG	6-Nov-09	5	N	B	METALS
Barium - uf	7440-39-3	252	ug/L	200		AP1-MW03	AP3052	REG	11-May-09	5	N		METALS
Barium - uf	7440-39-3	154	ug/L	200	J	AP1-MW03	AP3072	REG	6-Nov-09	5	N	B	METALS
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.4	N	U	VOLATILES
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.4	N	U	VOLATILES
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.4	N	U	VOLATILES
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.4	N	U	VOLATILES
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.4	N	U	VOLATILES
Benzene	71-43-2	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.4	N	U	VOLATILES
Benzo(a)anthracene	56-55-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12	ug/L	24	U	AP1-MW01	AP3050	REG	7-May-09	9.6	N	U	SEMIVOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Benzoic acid	65-85-0	12	ug/L	24	U	AP1-MW01	AP3070	REG	4-Nov-09	9.5	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12	ug/L	24	U	AP1-MW02	AP3051	REG	10-May-09	9.6	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	10	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW01	AP3050	REG	7-May-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW01	AP3070	REG	4-Nov-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW02	AP3051	REG	10-May-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW02	AP3071	REG	6-Nov-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW03	AP3052	REG	11-May-09	1	Y	U	METALS
Beryllium - f	7440-41-7	2	ug/L	4	U	AP1-MW03	AP3072	REG	6-Nov-09	1	Y	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW01	AP3050	REG	7-May-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW01	AP3070	REG	4-Nov-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW02	AP3051	REG	10-May-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	METALS
Beryllium - uf	7440-41-7	2	ug/L	4	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	METALS
Bis(2-chloroethoxy)methane	111-91-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.2	N	U	VOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.2	N	U	VOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.2	N	U	VOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.2	N	U	VOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.2	N	U	VOLATILES
Bromodichloromethane	75-27-4	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.2	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.33	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.33	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.33	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.33	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.33	N	U	VOLATILES
Bromoform	75-25-2	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.33	N	U	VOLATILES
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW01	AP3050	REG	7-May-09	0.78	N	U	VOLATILES
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.78	N	U	VOLATILES
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW02	AP3051	REG	10-May-09	0.78	N	U	VOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.78	N	U	VOLATILES
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW03	AP3052	REG	11-May-09	0.78	N	U	VOLATILES
Bromomethane	74-83-9	1	ug/L	2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.78	N	U	VOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW01	AP3050	REG	7-May-09	2	N	U	VOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	2	N	U	VOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW02	AP3051	REG	10-May-09	2	N	U	VOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	VOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	VOLATILES
Butanone, 2-	78-93-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	VOLATILES
Butyl benzyl phthalate	85-68-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW01	AP3050	REG	7-May-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW02	AP3051	REG	10-May-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	Y	U	METALS
Cadmium - f	7440-43-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	Y	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW01	AP3050	REG	7-May-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW02	AP3051	REG	10-May-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	METALS
Cadmium - uf	7440-43-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	METALS
Calcium - f	7440-70-2	283000	ug/L	1000		AP1-MW01	AP3050	REG	7-May-09	100	Y		METALS
Calcium - f	7440-70-2	181000	ug/L	1000		AP1-MW01	AP3070	REG	4-Nov-09	100	Y		METALS
Calcium - f	7440-70-2	201000	ug/L	1000		AP1-MW02	AP3051	REG	10-May-09	100	Y		METALS
Calcium - f	7440-70-2	165000	ug/L	1000		AP1-MW02	AP3071	REG	6-Nov-09	100	Y		METALS
Calcium - f	7440-70-2	90500	ug/L	1000		AP1-MW03	AP3052	REG	11-May-09	100	Y		METALS
Calcium - f	7440-70-2	95500	ug/L	1000		AP1-MW03	AP3072	REG	6-Nov-09	100	Y		METALS
Calcium - uf	7440-70-2	282000	ug/L	1000		AP1-MW01	AP3050	REG	7-May-09	100	N		METALS
Calcium - uf	7440-70-2	194000	ug/L	1000		AP1-MW01	AP3070	REG	4-Nov-09	100	N		METALS
Calcium - uf	7440-70-2	207000	ug/L	1000		AP1-MW02	AP3051	REG	10-May-09	100	N		METALS
Calcium - uf	7440-70-2	169000	ug/L	1000		AP1-MW02	AP3071	REG	6-Nov-09	100	N		METALS
Calcium - uf	7440-70-2	93400	ug/L	1000		AP1-MW03	AP3052	REG	11-May-09	100	N		METALS
Calcium - uf	7440-70-2	94300	ug/L	1000		AP1-MW03	AP3072	REG	6-Nov-09	100	N		METALS
Carbazole	86-74-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW01	AP3050	REG	7-May-09	0.4	N	U	VOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.4	N	U	VOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW02	AP3051	REG	10-May-09	0.4	N	U	VOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.4	N	U	VOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW03	AP3052	REG	11-May-09	0.4	N	U	VOLATILES
Carbon disulfide	75-15-0	1	ug/L	2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.4	N	U	VOLATILES
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.22	N	U	VOLATILES
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.22	N	U	VOLATILES
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.22	N	U	VOLATILES
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.22	N	U	VOLATILES
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.22	N	U	VOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Carbon tetrachloride	56-23-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.22	N	U	VOLATILES
Chloride	16887-00-6	11500	ug/L	2000		AP1-MW01	AP3050	REG	7-May-09	1000	N		GEN CHEMISTRY
Chloride	16887-00-6	40000	ug/L	10000		AP1-MW01	AP3070	REG	4-Nov-09	5000	N		GEN CHEMISTRY
Chloride	16887-00-6	25600	ug/L	2000		AP1-MW02	AP3051	REG	10-May-09	1000	N		GEN CHEMISTRY
Chloride	16887-00-6	35400	ug/L	10000		AP1-MW02	AP3071	REG	6-Nov-09	5000	N		GEN CHEMISTRY
Chloride	16887-00-6	38700	ug/L	2000		AP1-MW03	AP3052	REG	11-May-09	1000	N		GEN CHEMISTRY
Chloride	16887-00-6	37000	ug/L	4000		AP1-MW03	AP3072	REG	6-Nov-09	2000	N		GEN CHEMISTRY
Chloro-3-methylphenol, 4-	59-50-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.22	N	U	VOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.22	N	U	VOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.22	N	U	VOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.22	N	U	VOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.22	N	U	VOLATILES
Chlorobenzene	108-90-7	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.22	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	U	AP1-MW01	AP3050	REG	7-May-09	0.48	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.48	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	UJ	AP1-MW02	AP3051	REG	10-May-09	0.48	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.48	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	U	AP1-MW03	AP3052	REG	11-May-09	0.48	N	U	VOLATILES
Chloroethane	75-00-3	1	ug/L	2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.48	N	U	VOLATILES
Chloroform	67-66-3	0.48	ug/L	1	J	AP1-MW01	AP3050	REG	7-May-09	0.28	N	J	VOLATILES
Chloroform	67-66-3	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.28	N	U	VOLATILES
Chloroform	67-66-3	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.28	N	U	VOLATILES
Chloroform	67-66-3	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.28	N	U	VOLATILES
Chloroform	67-66-3	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.28	N	U	VOLATILES
Chloroform	67-66-3	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.28	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW01	AP3050	REG	7-May-09	0.61	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.61	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW02	AP3051	REG	10-May-09	0.61	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.61	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW03	AP3052	REG	11-May-09	0.61	N	U	VOLATILES
Chloromethane	74-87-3	1	ug/L	2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.61	N	U	VOLATILES
Chloronaphthalene, 2-	91-58-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.1	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.2	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	1.6	Y	U	METALS

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	1.6	Y	U	METALS
Chromium - f	7440-47-3	5.5	ug/L	10	J	AP1-MW03	AP3072	REG	6-Nov-09	1.6	Y	B	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	1.6	N	U	METALS
Chromium - uf	7440-47-3	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	1.6	N	U	METALS
Chrysene	218-01-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Cobalt - f	7440-48-4	22.5	ug/L	50	J	AP1-MW01	AP3050	REG	7-May-09	0.83	Y	B	METALS
Cobalt - f	7440-48-4	5.1	ug/L	50	J	AP1-MW01	AP3070	REG	4-Nov-09	0.83	Y	B	METALS
Cobalt - f	7440-48-4	3.2	ug/L	50	J	AP1-MW02	AP3051	REG	10-May-09	0.83	Y	B	METALS
Cobalt - f	7440-48-4	3.6	ug/L	50	J	AP1-MW02	AP3071	REG	6-Nov-09	0.83	Y	B	METALS
Cobalt - f	7440-48-4	25	ug/L	50	U	AP1-MW03	AP3052	REG	11-May-09	0.83	Y	U	METALS
Cobalt - f	7440-48-4	5.1	ug/L	50	J	AP1-MW03	AP3072	REG	6-Nov-09	0.83	Y	B	METALS
Cobalt - uf	7440-48-4	22.2	ug/L	50	J	AP1-MW01	AP3050	REG	7-May-09	0.83	N	B	METALS
Cobalt - uf	7440-48-4	6.8	ug/L	50	J	AP1-MW01	AP3070	REG	4-Nov-09	0.83	N	B	METALS
Cobalt - uf	7440-48-4	3	ug/L	50	J	AP1-MW02	AP3051	REG	10-May-09	0.83	N	B	METALS
Cobalt - uf	7440-48-4	3.6	ug/L	50	J	AP1-MW02	AP3071	REG	6-Nov-09	0.83	N	B	METALS
Cobalt - uf	7440-48-4	1	ug/L	50	J	AP1-MW03	AP3052	REG	11-May-09	0.83	N	B	METALS
Cobalt - uf	7440-48-4	2.7	ug/L	50	J	AP1-MW03	AP3072	REG	6-Nov-09	0.83	N	B	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-MW01	AP3050	REG	7-May-09	2.1	Y	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-MW01	AP3070	REG	4-Nov-09	2.1	Y	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-MW02	AP3051	REG	10-May-09	2.1	Y	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	2.1	Y	U	METALS
Copper - f	7440-50-8	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	2.1	Y	U	METALS
Copper - f	7440-50-8	10.5	ug/L	25	J	AP1-MW03	AP3072	REG	6-Nov-09	2.1	Y	B	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW01	AP3050	REG	7-May-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW01	AP3070	REG	4-Nov-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW02	AP3051	REG	10-May-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	2.1	N	U	METALS
Copper - uf	7440-50-8	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	2.1	N	U	METALS
Cyanide, total	57-12-5	5	ug/L	10	UJ	AP1-MW01	AP3050	REG	7-May-09	5	N	U	GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	5	N	U	GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	UJ	AP1-MW02	AP3051	REG	10-May-09	5	N	U	GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	5	N	U	GEN CHEMISTRY
Cyanide, total	57-12-5	5	ug/L	10	UJ	AP1-MW03	AP3052	REG	11-May-09	5	N	U	GEN CHEMISTRY
Dibenz(a,h)anthracene	53-70-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.2	N	U	VOLATILES
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.2	N	U	VOLATILES
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.2	N	U	VOLATILES
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.2	N	U	VOLATILES

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Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.2	N	U	VOLATILES
Dibromochloromethane	124-48-1	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.2	N	U	VOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	4.8	ug/L	9.6	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	4.75	ug/L	9.5	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	4.8	ug/L	9.6	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.24	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.24	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.24	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.24	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.24	N	U	VOLATILES
Dichloroethane, 1,1-	75-34-3	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.24	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.34	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.34	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.34	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.34	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.34	N	U	VOLATILES
Dichloroethane, 1,2-	107-06-2	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.34	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.54	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.54	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.54	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.54	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.54	N	U	VOLATILES
Dichloroethene, 1,1-	75-35-4	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.54	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.2	N	U	VOLATILES
Dichloroethene, cis-1,2-	156-59-2	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.2	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.45	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.45	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.45	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.45	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.45	N	U	VOLATILES
Dichloroethene, trans-1,2-	156-60-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.45	N	U	VOLATILES
Dichlorophenol, 2,4-	120-83-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.3	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.21	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.21	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.21	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.21	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.21	N	U	VOLATILES
Dichloropropane, 1,2-	78-87-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.21	N	U	VOLATILES
Dichloropropene, cis-1,3-	10061-01-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.21	N	U	VOLATILES
Dichloropropene, trans-1,3-	10061-02-6	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.21	N	U	VOLATILES
Diethyl phthalate	84-66-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.1	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.2	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	4.8	ug/L	9.6	U	AP1-MW01	AP3050	REG	7-May-09	3.8	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	4.75	ug/L	9.5	U	AP1-MW01	AP3070	REG	4-Nov-09	3.8	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	4.8	ug/L	9.6	U	AP1-MW02	AP3051	REG	10-May-09	3.8	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	4	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	4	N	U	SEMIVOLATILES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.05	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.05	N	U	EXPLOSIVES
Dinitrophenol, 2,4-	51-28-5	12	ug/L	24	U	AP1-MW01	AP3050	REG	7-May-09	9.6	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12	ug/L	24	U	AP1-MW01	AP3070	REG	4-Nov-09	9.5	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12	ug/L	24	U	AP1-MW02	AP3051	REG	10-May-09	9.6	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	10	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Dinitrotoluene, 2,4-	121-14-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4- exp	121-14-2	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.063	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.064	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.063	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.064	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.063	N	U	EXPLOSIVES
Dinitrotoluene, 2,4- exp	121-14-2	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.064	N	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6- exp	606-20-2	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.09	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.091	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.09	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.092	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.09	N	U	EXPLOSIVES
Dinitrotoluene, 2,6- exp	606-20-2	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.091	N	U	EXPLOSIVES
Di-n-octyl phthalate	117-84-0	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.4	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.4	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.4	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.5	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.5	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.5	N	U	SEMIVOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.43	N	U	VOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.43	N	U	VOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.43	N	U	VOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.43	N	U	VOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.43	N	U	VOLATILES
Ethylbenzene	100-41-4	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.43	N	U	VOLATILES
Fluoranthene	206-44-0	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	2.4	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	2.4	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	2.4	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2.5	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2.5	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2.5	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.3	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	2.4	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	2.4	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	2.4	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2.5	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2.5	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2.5	N	U	SEMIVOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	5	N	U	VOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	5	N	U	VOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	5	N	U	VOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	5	N	U	VOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	5	N	U	VOLATILES
Hexanone, 2-	591-78-6	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	5	N	U	VOLATILES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.11	N	U	EXPLOSIVES
HMX	2691-41-0	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.11	N	U	EXPLOSIVES
Indeno(1,2,3-cd)pyrene	193-39-5	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.1	N	U	SEMIVOLATILES
Iron - f	7439-89-6	4590	ug/L	300		AP1-MW01	AP3050	REG	7-May-09	23	Y		METALS
Iron - f	7439-89-6	4990	ug/L	300		AP1-MW01	AP3070	REG	4-Nov-09	23	Y		METALS
Iron - f	7439-89-6	300	ug/L	600	U	AP1-MW02	AP3051	REG	10-May-09	460	Y	U	METALS
Iron - f	7439-89-6	150	ug/L	300	U	AP1-MW02	AP3071	REG	6-Nov-09	23	Y	U	METALS
Iron - f	7439-89-6	150	ug/L	300	U	AP1-MW03	AP3052	REG	11-May-09	23	Y	U	METALS
Iron - f	7439-89-6	6070	ug/L	300		AP1-MW03	AP3072	REG	6-Nov-09	23	Y		METALS
Iron - uf	7439-89-6	4610	ug/L	300		AP1-MW01	AP3050	REG	7-May-09	23	N		METALS
Iron - uf	7439-89-6	4410	ug/L	300		AP1-MW01	AP3070	REG	4-Nov-09	23	N		METALS
Iron - uf	7439-89-6	150	ug/L	300	U	AP1-MW02	AP3051	REG	10-May-09	23	N	U	METALS
Iron - uf	7439-89-6	150	ug/L	300	U	AP1-MW02	AP3071	REG	6-Nov-09	23	N	U	METALS
Iron - uf	7439-89-6	1090	ug/L	300		AP1-MW03	AP3052	REG	11-May-09	23	N		METALS
Iron - uf	7439-89-6	150	ug/L	300	U	AP1-MW03	AP3072	REG	6-Nov-09	23	N	U	METALS
Isophorone	78-59-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Lead - f	7439-92-1	5.8	ug/L	5		AP1-MW01	AP3050	REG	7-May-09	2	Y		METALS
Lead - f	7439-92-1	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	2	Y	U	METALS
Lead - f	7439-92-1	2	ug/L	10	J	AP1-MW02	AP3051	REG	10-May-09	2	Y	B	METALS
Lead - f	7439-92-1	2.2	ug/L	5	J	AP1-MW02	AP3071	REG	6-Nov-09	2	Y	B	METALS
Lead - f	7439-92-1	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	2	Y	U	METALS
Lead - f	7439-92-1	4.9	ug/L	5	J	AP1-MW03	AP3072	REG	6-Nov-09	2	Y	B	METALS
Lead - uf	7439-92-1	4.3	ug/L	5	J	AP1-MW01	AP3050	REG	7-May-09	2	N	B	METALS
Lead - uf	7439-92-1	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	2	N	U	METALS
Lead - uf	7439-92-1	2.2	ug/L	10	J	AP1-MW03	AP3052	REG	11-May-09	2	N	B	METALS
Magnesium - f	7439-95-4	77600	ug/L	5000		AP1-MW01	AP3050	REG	7-May-09	100	Y		METALS
Magnesium - f	7439-95-4	61000	ug/L	5000		AP1-MW01	AP3070	REG	4-Nov-09	100	Y		METALS
Magnesium - f	7439-95-4	90800	ug/L	5000		AP1-MW02	AP3051	REG	10-May-09	100	Y		METALS
Magnesium - f	7439-95-4	75000	ug/L	5000		AP1-MW02	AP3071	REG	6-Nov-09	100	Y		METALS
Magnesium - f	7439-95-4	38400	ug/L	5000		AP1-MW03	AP3052	REG	11-May-09	100	Y		METALS
Magnesium - f	7439-95-4	39200	ug/L	5000		AP1-MW03	AP3072	REG	6-Nov-09	100	Y		METALS
Magnesium - uf	7439-95-4	77100	ug/L	5000		AP1-MW01	AP3050	REG	7-May-09	100	N		METALS
Magnesium - uf	7439-95-4	63200	ug/L	5000		AP1-MW01	AP3070	REG	4-Nov-09	100	N		METALS
Magnesium - uf	7439-95-4	92400	ug/L	5000		AP1-MW02	AP3051	REG	10-May-09	100	N		METALS

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Magnesium - uf	7439-95-4	74900	ug/L	5000		AP1-MW02	AP3071	REG	6-Nov-09	100	N		METALS
Magnesium - uf	7439-95-4	39100	ug/L	5000		AP1-MW03	AP3052	REG	11-May-09	100	N		METALS
Magnesium - uf	7439-95-4	38700	ug/L	5000		AP1-MW03	AP3072	REG	6-Nov-09	100	N		METALS
Manganese - f	7439-96-5	32100	ug/L	150		AP1-MW01	AP3050	REG	7-May-09	5	Y		METALS
Manganese - f	7439-96-5	6270	ug/L	60		AP1-MW01	AP3070	REG	4-Nov-09	2	Y		METALS
Manganese - f	7439-96-5	355	ug/L	15		AP1-MW02	AP3051	REG	10-May-09	0.5	Y		METALS
Manganese - f	7439-96-5	410	ug/L	15		AP1-MW02	AP3071	REG	6-Nov-09	0.5	Y		METALS
Manganese - f	7439-96-5	102	ug/L	15		AP1-MW03	AP3052	REG	11-May-09	0.5	Y		METALS
Manganese - f	7439-96-5	550	ug/L	15		AP1-MW03	AP3072	REG	6-Nov-09	0.5	Y		METALS
Manganese - uf	7439-96-5	32300	ug/L	150		AP1-MW01	AP3050	REG	7-May-09	5	N		METALS
Manganese - uf	7439-96-5	8290	ug/L	60		AP1-MW01	AP3070	REG	4-Nov-09	2	N		METALS
Manganese - uf	7439-96-5	351	ug/L	15		AP1-MW02	AP3051	REG	10-May-09	0.5	N		METALS
Manganese - uf	7439-96-5	436	ug/L	15		AP1-MW02	AP3071	REG	6-Nov-09	0.5	N		METALS
Manganese - uf	7439-96-5	136	ug/L	15		AP1-MW03	AP3052	REG	11-May-09	0.5	N		METALS
Manganese - uf	7439-96-5	463	ug/L	15		AP1-MW03	AP3072	REG	6-Nov-09	0.5	N		METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.14	Y	U	METALS
Mercury - f	7439-97-6	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.14	Y	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.14	N	U	METALS
Mercury - uf	7439-97-6	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.14	N	U	METALS
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW01	AP3050	REG	7-May-09	2	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	2	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW02	AP3051	REG	10-May-09	2	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	VOLATILES
Methyl-2-pentanone, 4-	108-10-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW01	AP3050	REG	7-May-09	1	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW01	AP3070	REG	4-Nov-09	1	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW02	AP3051	REG	10-May-09	1	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	VOLATILES
Methylene chloride	75-09-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	VOLATILES
Methylnaphthalene, 2-	91-57-6	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Nickel - f	7440-02-0	12.8	ug/L	40	J	AP1-MW01	AP3050	REG	7-May-09	2.3	Y	B	METALS
Nickel - f	7440-02-0	3.9	ug/L	40	J	AP1-MW01	AP3070	REG	4-Nov-09	2.3	Y	B	METALS
Nickel - f	7440-02-0	14.8	ug/L	40	J	AP1-MW02	AP3051	REG	10-May-09	2.3	Y	B	METALS
Nickel - f	7440-02-0	6.1	ug/L	40	J	AP1-MW02	AP3071	REG	6-Nov-09	2.3	Y	B	METALS
Nickel - f	7440-02-0	6.6	ug/L	40	J	AP1-MW03	AP3052	REG	11-May-09	2.3	Y	B	METALS

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Nickel - f	7440-02-0	13.4	ug/L	40	J	AP1-MW03	AP3072	REG	6-Nov-09	2.3	Y	B	METALS
Nickel - uf	7440-02-0	13.3	ug/L	40	J	AP1-MW01	AP3050	REG	7-May-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	4.1	ug/L	40		AP1-MW01	AP3070	REG	4-Nov-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	15.2	ug/L	40	J	AP1-MW02	AP3051	REG	10-May-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	5.8	ug/L	40	J	AP1-MW02	AP3071	REG	6-Nov-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	7.4	ug/L	40	J	AP1-MW03	AP3052	REG	11-May-09	2.3	N	B	METALS
Nickel - uf	7440-02-0	4.7	ug/L	40	J	AP1-MW03	AP3072	REG	6-Nov-09	2.3	N	B	METALS
Nitrate-Nitrite	10-28-6	50	ug/L	100	U	AP1-MW01	AP3050	REG	7-May-09	37	N	U	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	130	ug/L	100	J	AP1-MW01	AP3070	REG	4-Nov-09	30	N		GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	1000	ug/L	2000	U	AP1-MW02	AP3051	REG	10-May-09	740	N	U	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	41	ug/L	100	J	AP1-MW02	AP3071	REG	6-Nov-09	30	N	B	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	1000	ug/L	2000	U	AP1-MW03	AP3052	REG	11-May-09	740	N	U	GEN CHEMISTRY
Nitrate-Nitrite	10-28-6	55	ug/L	100	J	AP1-MW03	AP3072	REG	6-Nov-09	30	N	B	GEN CHEMISTRY
Nitroaniline, 2-	88-74-4	4.8	ug/L	9.6	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	4.75	ug/L	9.5	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	4.8	ug/L	9.6	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	4.8	ug/L	9.6	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	4.75	ug/L	9.5	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	4.8	ug/L	9.6	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	4.8	ug/L	9.6	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	4.75	ug/L	9.5	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	4.8	ug/L	9.6	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Nitrobenzene - exp	98-95-3	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.049	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.049	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.049	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.05	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.049	N	U	EXPLOSIVES
Nitrobenzene - exp	98-95-3	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.049	N	U	EXPLOSIVES
Nitrophenol, 2-	88-75-5	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12	ug/L	24	U	AP1-MW01	AP3050	REG	7-May-09	9.6	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12	ug/L	24	U	AP1-MW01	AP3070	REG	4-Nov-09	9.5	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12	ug/L	24	U	AP1-MW02	AP3051	REG	10-May-09	9.6	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	10	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.062	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.18	ug/L	0.2	J	AP1-MW01	AP3070	REG	4-Nov-09	0.063	N	J	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.062	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.063	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.062	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.063	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.094	N	U	EXPLOSIVES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.095	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.094	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.096	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.094	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.095	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.074	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.17	ug/L	0.2	J	AP1-MW01	AP3070	REG	4-Nov-09	0.075	N	J	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.074	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.075	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.074	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.075	N	U	EXPLOSIVES
n-Nitroso-di-n-propylamine	621-64-7	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.9	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.9	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.9	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	2	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	2	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	2	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12	ug/L	24	U	AP1-MW01	AP3050	REG	7-May-09	9.6	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12	ug/L	24	U	AP1-MW01	AP3070	REG	4-Nov-09	9.5	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12	ug/L	24	U	AP1-MW02	AP3051	REG	10-May-09	9.6	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-MW02	AP3071	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-MW03	AP3052	REG	11-May-09	10	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-MW03	AP3072	REG	6-Nov-09	10	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Phenol	108-95-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Phenol	108-95-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Potassium - f	7440-09-7	2760	ug/L	10000	J	AP1-MW01	AP3050	REG	7-May-09	100	Y	B	METALS
Potassium - f	7440-09-7	7000	ug/L	10000	J	AP1-MW01	AP3070	REG	4-Nov-09	100	Y	B	METALS
Potassium - f	7440-09-7	28500	ug/L	10000		AP1-MW02	AP3051	REG	10-May-09	100	Y		METALS
Potassium - f	7440-09-7	22000	ug/L	10000		AP1-MW02	AP3071	REG	6-Nov-09	100	Y		METALS
Potassium - f	7440-09-7	20400	ug/L	10000		AP1-MW03	AP3052	REG	11-May-09	100	Y		METALS
Potassium - f	7440-09-7	20500	ug/L	10000		AP1-MW03	AP3072	REG	6-Nov-09	100	Y		METALS
Potassium - uf	7440-09-7	2820	ug/L	10000	J	AP1-MW01	AP3050	REG	7-May-09	100	N	B	METALS
Potassium - uf	7440-09-7	6650	ug/L	10000	J	AP1-MW01	AP3070	REG	4-Nov-09	100	N	B	METALS
Potassium - uf	7440-09-7	28200	ug/L	10000		AP1-MW02	AP3051	REG	10-May-09	100	N		METALS
Potassium - uf	7440-09-7	21900	ug/L	10000		AP1-MW02	AP3071	REG	6-Nov-09	100	N		METALS
Potassium - uf	7440-09-7	20700	ug/L	10000		AP1-MW03	AP3052	REG	11-May-09	100	N		METALS
Potassium - uf	7440-09-7	19300	ug/L	10000		AP1-MW03	AP3072	REG	6-Nov-09	100	N		METALS
Pyrene	129-00-0	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.073	N	U	EXPLOSIVES
RDX	121-82-4	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.074	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.073	N	U	EXPLOSIVES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
RDX	121-82-4	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.074	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.073	N	U	EXPLOSIVES
RDX	121-82-4	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.074	N	U	EXPLOSIVES
Selenium - f	7782-49-2	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	3.1	Y	U	METALS
Selenium - f	7782-49-2	10	ug/L	20	U	AP1-MW01	AP3070	REG	4-Nov-09	3.1	Y	U	METALS
Selenium - f	7782-49-2	6.9	ug/L	20	J	AP1-MW02	AP3051	REG	10-May-09	3.1	Y	B	METALS
Selenium - f	7782-49-2	10	ug/L	20	U	AP1-MW02	AP3071	REG	6-Nov-09	3.1	Y	U	METALS
Selenium - f	7782-49-2	5.3	ug/L	20	J	AP1-MW03	AP3052	REG	11-May-09	3.1	Y	B	METALS
Selenium - f	7782-49-2	10	ug/L	20	U	AP1-MW03	AP3072	REG	6-Nov-09	3.1	Y	U	METALS
Selenium - uf	7782-49-2	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	3.1	N	U	METALS
Selenium - uf	7782-49-2	10	ug/L	20	U	AP1-MW01	AP3070	REG	4-Nov-09	3.1	N	U	METALS
Selenium - uf	7782-49-2	4.9	ug/L	20	J	AP1-MW02	AP3051	REG	10-May-09	3.1	N	B	METALS
Selenium - uf	7782-49-2	3.7	ug/L	20	J	AP1-MW02	AP3071	REG	6-Nov-09	3.1	N	B	METALS
Selenium - uf	7782-49-2	4.7	ug/L	20	J	AP1-MW03	AP3052	REG	11-May-09	3.1	N	B	METALS
Selenium - uf	7782-49-2	5.2	ug/L	20	J	AP1-MW03	AP3072	REG	6-Nov-09	3.1	N	B	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	1.2	Y	U	METALS
Silver - f	7440-22-4	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	1.2	Y	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	1.2	N	U	METALS
Silver - uf	7440-22-4	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	1.2	N	U	METALS
Sodium - f	7440-23-5	21000	ug/L	10000		AP1-MW01	AP3050	REG	7-May-09	500	Y		METALS
Sodium - f	7440-23-5	44300	ug/L	10000		AP1-MW01	AP3070	REG	4-Nov-09	500	Y		METALS
Sodium - f	7440-23-5	69900	ug/L	10000		AP1-MW02	AP3051	REG	10-May-09	500	Y		METALS
Sodium - f	7440-23-5	81700	ug/L	20000		AP1-MW02	AP3071	REG	6-Nov-09	1000	Y		METALS
Sodium - f	7440-23-5	53900	ug/L	10000		AP1-MW03	AP3052	REG	11-May-09	500	Y		METALS
Sodium - f	7440-23-5	60500	ug/L	10000		AP1-MW03	AP3072	REG	6-Nov-09	500	Y		METALS
Sodium - uf	7440-23-5	18900	ug/L	10000		AP1-MW01	AP3050	REG	7-May-09	500	N		METALS
Sodium - uf	7440-23-5	42900	ug/L	10000		AP1-MW01	AP3070	REG	4-Nov-09	500	N		METALS
Sodium - uf	7440-23-5	68400	ug/L	10000		AP1-MW02	AP3051	REG	10-May-09	500	N		METALS
Sodium - uf	7440-23-5	81300	ug/L	20000		AP1-MW02	AP3071	REG	6-Nov-09	1000	N		METALS
Sodium - uf	7440-23-5	52400	ug/L	10000		AP1-MW03	AP3052	REG	11-May-09	500	N		METALS
Sodium - uf	7440-23-5	59300	ug/L	10000		AP1-MW03	AP3072	REG	6-Nov-09	500	N		METALS
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.36	N	U	VOLATILES
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.36	N	U	VOLATILES
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.36	N	U	VOLATILES
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.36	N	U	VOLATILES
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.36	N	U	VOLATILES
Styrene	100-42-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.36	N	U	VOLATILES
Sulfate	14808-79-8	585000	ug/L	20000		AP1-MW01	AP3050	REG	7-May-09	10000	N		GEN CHEMISTRY
Sulfate	14808-79-8	311000	ug/L	10000	J	AP1-MW01	AP3070	REG	4-Nov-09	5000	N		GEN CHEMISTRY
Sulfate	14808-79-8	589000	ug/L	20000		AP1-MW02	AP3051	REG	10-May-09	10000	N		GEN CHEMISTRY
Sulfate	14808-79-8	358000	ug/L	200000	J	AP1-MW02	AP3071	REG	6-Nov-09	100000	N		GEN CHEMISTRY
Sulfate	14808-79-8	127000	ug/L	4000		AP1-MW03	AP3052	REG	11-May-09	2000	N		GEN CHEMISTRY
Sulfate	14808-79-8	109000	ug/L	4000		AP1-MW03	AP3072	REG	6-Nov-09	2000	N		GEN CHEMISTRY
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.21	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.21	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.21	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.21	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.21	N	U	VOLATILES
Tetrachloroethane, 1,1,2,2-	79-34-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.21	N	U	VOLATILES
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.22	N	U	VOLATILES
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.22	N	U	VOLATILES
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.22	N	U	VOLATILES
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.22	N	U	VOLATILES
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.22	N	U	VOLATILES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Tetrachloroethene	127-18-4	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.22	N	U	VOLATILES
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.076	N	U	EXPLOSIVES
Tetryl	479-45-8	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.076	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.076	N	U	EXPLOSIVES
Tetryl	479-45-8	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.077	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.076	N	U	EXPLOSIVES
Tetryl	479-45-8	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.076	N	U	EXPLOSIVES
Thallium - f	7440-28-0	37.8	ug/L	20		AP1-MW01	AP3050	REG	7-May-09	3.4	Y		METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	3.4	Y	U	METALS
Thallium - f	7440-28-0	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	3.4	Y	U	METALS
Thallium - uf	7440-28-0	34.6	ug/L	20		AP1-MW01	AP3050	REG	7-May-09	3.4	N		METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-MW01	AP3070	REG	4-Nov-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-MW02	AP3051	REG	10-May-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-MW02	AP3071	REG	6-Nov-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-MW03	AP3052	REG	11-May-09	3.4	N	U	METALS
Thallium - uf	7440-28-0	5	ug/L	10	U	AP1-MW03	AP3072	REG	6-Nov-09	3.4	N	U	METALS
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.35	N	U	VOLATILES
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.35	N	U	VOLATILES
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.35	N	U	VOLATILES
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.35	N	U	VOLATILES
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.35	N	U	VOLATILES
Toluene	108-88-3	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.35	N	U	VOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	0.96	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	0.95	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	0.96	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1	N	U	SEMIVOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,1-	71-55-6	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.33	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.26	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.26	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.26	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.26	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.26	N	U	VOLATILES
Trichloroethane, 1,1,2-	79-00-5	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.26	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.32	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.32	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.32	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.32	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.32	N	U	VOLATILES
Trichloroethene	79-01-6	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.32	N	U	VOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.4	ug/L	4.8	U	AP1-MW01	AP3050	REG	7-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.4	ug/L	4.8	U	AP1-MW01	AP3070	REG	4-Nov-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.4	ug/L	4.8	U	AP1-MW02	AP3051	REG	10-May-09	1.3	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-MW02	AP3071	REG	6-Nov-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-MW03	AP3052	REG	11-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-MW03	AP3072	REG	6-Nov-09	1.4	N	U	SEMIVOLATILES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.049	N	U	EXPLOSIVES

Appendix E-4
Overburden Groundwater Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

4-	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.049	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.049	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.05	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.049	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.049	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-MW01	AP3050	REG	7-May-09	0.067	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.2	U	AP1-MW01	AP3070	REG	4-Nov-09	0.068	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-MW02	AP3051	REG	10-May-09	0.067	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.2	U	AP1-MW02	AP3071	REG	6-Nov-09	0.068	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-MW03	AP3052	REG	11-May-09	0.067	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.2	U	AP1-MW03	AP3072	REG	6-Nov-09	0.068	N	U	EXPLOSIVES
Vanadium - f	7440-62-2	25	ug/L	50	U	AP1-MW01	AP3050	REG	7-May-09	0.66	Y	U	METALS
Vanadium - f	7440-62-2	25	ug/L	50	U	AP1-MW01	AP3070	REG	4-Nov-09	0.66	Y	U	METALS
Vanadium - f	7440-62-2	1.1	ug/L	50	J	AP1-MW02	AP3051	REG	10-May-09	0.66	Y	B	METALS
Vanadium - f	7440-62-2	25	ug/L	50	U	AP1-MW02	AP3071	REG	6-Nov-09	0.66	Y	U	METALS
Vanadium - f	7440-62-2	0.9	ug/L	50	J	AP1-MW03	AP3052	REG	11-May-09	0.66	Y	B	METALS
Vanadium - f	7440-62-2	5.9	ug/L	50	J	AP1-MW03	AP3072	REG	6-Nov-09	0.66	Y	B	METALS
Vanadium - uf	7440-62-2	25	ug/L	50	U	AP1-MW01	AP3050	REG	7-May-09	0.66	N	U	METALS
Vanadium - uf	7440-62-2	25	ug/L	50	U	AP1-MW01	AP3070	REG	4-Nov-09	0.66	N	U	METALS
Vanadium - uf	7440-62-2	1.2	ug/L	50	J	AP1-MW02	AP3051	REG	10-May-09	0.66	N	B	METALS
Vanadium - uf	7440-62-2	25	ug/L	50	U	AP1-MW02	AP3071	REG	6-Nov-09	0.66	N	U	METALS
Vanadium - uf	7440-62-2	2.9	ug/L	50	J	AP1-MW03	AP3052	REG	11-May-09	0.66	N	B	METALS
Vanadium - uf	7440-62-2	25	ug/L	50	U	AP1-MW03	AP3072	REG	6-Nov-09	0.66	N	U	METALS
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW01	AP3050	REG	7-May-09	0.3	N	U	VOLATILES
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW01	AP3070	REG	4-Nov-09	0.3	N	U	VOLATILES
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW02	AP3051	REG	10-May-09	0.3	N	U	VOLATILES
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW02	AP3071	REG	6-Nov-09	0.3	N	U	VOLATILES
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW03	AP3052	REG	11-May-09	0.3	N	U	VOLATILES
Vinyl chloride	75-01-4	0.5	ug/L	1	U	AP1-MW03	AP3072	REG	6-Nov-09	0.3	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW01	AP3050	REG	7-May-09	1.2	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW01	AP3070	REG	4-Nov-09	1.2	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW02	AP3051	REG	10-May-09	1.2	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW02	AP3071	REG	6-Nov-09	1.2	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW03	AP3052	REG	11-May-09	1.2	N	U	VOLATILES
Xylenes, total	1330-20-7	1.5	ug/L	3	U	AP1-MW03	AP3072	REG	6-Nov-09	1.2	N	U	VOLATILES
Zinc - f	7440-66-6	23.2	ug/L	20		AP1-MW01	AP3050	REG	7-May-09	3.8	Y		METALS
Zinc - f	7440-66-6	9.2	ug/L	20	J	AP1-MW01	AP3070	REG	4-Nov-09	3.8	Y	B	METALS
Zinc - f	7440-66-6	12.1	ug/L	20	J	AP1-MW02	AP3051	REG	10-May-09	3.8	Y	B	METALS
Zinc - f	7440-66-6	11.4	ug/L	20	J	AP1-MW02	AP3071	REG	6-Nov-09	3.8	Y	B	METALS
Zinc - f	7440-66-6	11.4	ug/L	20	J	AP1-MW03	AP3052	REG	11-May-09	3.8	Y	B	METALS
Zinc - f	7440-66-6	23.4	ug/L	20		AP1-MW03	AP3072	REG	6-Nov-09	3.8	Y		METALS
Zinc - uf	7440-66-6	23.2	ug/L	20		AP1-MW01	AP3050	REG	7-May-09	3.8	N		METALS
Zinc - uf	7440-66-6	13.4	ug/L	20	J	AP1-MW02	AP3051	REG	10-May-09	3.8	N	B	METALS
Zinc - uf	7440-66-6	10	ug/L	20	U	AP1-MW02	AP3071	REG	6-Nov-09	3.8	N	U	METALS
Zinc - uf	7440-66-6	14.3	ug/L	20	J	AP1-MW03	AP3052	REG	11-May-09	3.8	N	B	METALS

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
3-Methylphenol and 4-Methylphenol	65794-96-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
3-Methylphenol and 4-Methylphenol	65794-96-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Acenaphthene	83-32-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Acenaphthene	83-32-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Acenaphthene	83-32-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Acenaphthene	83-32-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Acenaphthylene	208-96-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Acenaphthylene	208-96-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Acenaphthylene	208-96-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Acenaphthylene	208-96-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Aluminum	7429-90-5	9880	mg/kg	15		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.84		METALS
Aluminum	7429-90-5	7130	mg/kg	13		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.7		METALS
Aluminum	7429-90-5	4490	mg/kg	15		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.82		METALS
Aluminum	7429-90-5	9860	mg/kg	24		AP1-SD04	AP1013	REG	20-May-09	0	0.5	1.3		METALS
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.044	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.047	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.048	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.18	U	5-	AP1013	REG	20-May-09	0	0.5	0.044	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.095	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.1	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.096	U	EXPLOSIVES
Anthracene	120-12-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Anthracene	120-12-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Anthracene	120-12-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Anthracene	120-12-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Antimony	7440-36-0	0.5	mg/kg	4.6	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.34	B	METALS
Antimony	7440-36-0	0.7	mg/kg	3.8	J	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.29	B	METALS
Antimony	7440-36-0	2.25	mg/kg	4.5	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.34	U	METALS
Antimony	7440-36-0	1.3	mg/kg	7.3	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.54	B	METALS
Aroclor 1016	12674-11-2	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1016	12674-11-2	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.011	U	PEST/PCB
Aroclor 1016	12674-11-2	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1016	12674-11-2	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1221	11104-28-2	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1221	11104-28-2	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.018	U	PEST/PCB
Aroclor 1221	11104-28-2	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1221	11104-28-2	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.033	U	PEST/PCB
Aroclor 1232	11141-16-5	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1232	11141-16-5	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.018	U	PEST/PCB
Aroclor 1232	11141-16-5	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1232	11141-16-5	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.033	U	PEST/PCB
Aroclor 1242	53469-21-9	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1242	53469-21-9	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.011	U	PEST/PCB
Aroclor 1242	53469-21-9	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1242	53469-21-9	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1248	12672-29-6	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1248	12672-29-6	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.011	U	PEST/PCB
Aroclor 1248	12672-29-6	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1248	12672-29-6	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.021	U	PEST/PCB
Aroclor 1254	11097-69-1	0.025	mg/kg	0.027	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.013	J	PEST/PCB
Aroclor 1254	11097-69-1	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.011	U	PEST/PCB
Aroclor 1254	11097-69-1	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1254	11097-69-1	0.035	mg/kg	0.041	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.021	J	PEST/PCB
Aroclor 1260	11096-82-5	0.021	mg/kg	0.027	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.013	J	PEST/PCB
Aroclor 1260	11096-82-5	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.011	U	PEST/PCB
Aroclor 1260	11096-82-5	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.013	U	PEST/PCB
Aroclor 1260	11096-82-5	0.113	mg/kg	0.041	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.021	J	PEST/PCB
Arsenic	7440-38-2	7.6	mg/kg	0.61		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.27		METALS
Arsenic	7440-38-2	9.3	mg/kg	0.51		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.23		METALS
Arsenic	7440-38-2	4	mg/kg	0.6		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.27		METALS
Arsenic	7440-38-2	15.9	mg/kg	0.97		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.44		METALS

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Barium	7440-39-3	57.5	mg/kg	15		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.38		METALS
Barium	7440-39-3	35.7	mg/kg	13		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.32		METALS
Barium	7440-39-3	31.3	mg/kg	15		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.37		METALS
Barium	7440-39-3	110	mg/kg	24		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.61		METALS
Benzo(a)anthracene	56-55-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	0.121	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	0.112	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	0.175	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Benzoic acid	65-85-0	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	2.2	U	SEMIVOLATILES
Benzoic acid	65-85-0	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Benzoic acid	65-85-0	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.52	U	SEMIVOLATILES
Benzoic acid	65-85-0	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.84	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Beryllium	7440-41-7	0.62	mg/kg	0.38		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.076		METALS
Beryllium	7440-41-7	0.5	mg/kg	0.32		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.064		METALS
Beryllium	7440-41-7	0.3	mg/kg	0.37	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.075	B	METALS
Beryllium	7440-41-7	1.6	mg/kg	0.61		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.12		METALS
Bis(2-chloroethoxy)methane	111-91-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	1.1	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.26	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.42	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Cadmium	7440-43-9	0.55	mg/kg	0.3		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.076		METALS
Cadmium	7440-43-9	0.32	mg/kg	0.25		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.064		METALS
Cadmium	7440-43-9	0.23	mg/kg	0.3	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.075	B	METALS
Cadmium	7440-43-9	0.59	mg/kg	0.48		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.12		METALS

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Calcium	7440-70-2	29900	mg/kg	380		AP1-SD01	AP1007	REG	19-May-09	0	0.5	7.6		METALS
Calcium	7440-70-2	10400	mg/kg	320		AP1-SD02	AP1008	REG	19-May-09	0	0.5	6.4		METALS
Calcium	7440-70-2	16800	mg/kg	370		AP1-SD03	AP1012	REG	19-May-09	0	0.5	7.5		METALS
Calcium	7440-70-2	13700	mg/kg	610		AP1-SD04	AP1013	REG	20-May-09	0	0.5	12		METALS
Carbazole	86-74-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Carbazole	86-74-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Carbazole	86-74-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Carbazole	86-74-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Chromium	7440-47-3	16.9	mg/kg	0.76		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.12		METALS
Chromium	7440-47-3	11.8	mg/kg	0.64		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.1		METALS
Chromium	7440-47-3	7.8	mg/kg	0.75		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.12		METALS
Chromium	7440-47-3	15.6	mg/kg	1.2		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.19		METALS
Chrysene	218-01-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Chrysene	218-01-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Chrysene	218-01-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Chrysene	218-01-9	0.149	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Cobalt	7440-48-4	9.9	mg/kg	3.8		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.063		METALS
Cobalt	7440-48-4	8.9	mg/kg	3.2		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.053		METALS
Cobalt	7440-48-4	4.4	mg/kg	3.7		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.062		METALS
Cobalt	7440-48-4	9.1	mg/kg	6.1		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.1		METALS
Copper	7440-50-8	38.5	mg/kg	1.9		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.16		METALS
Copper	7440-50-8	17.1	mg/kg	1.6		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.13		METALS
Copper	7440-50-8	10.5	mg/kg	1.9		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.16		METALS
Copper	7440-50-8	24.5	mg/kg	3		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.25		METALS
Dibenz(a,h)anthracene	53-70-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Dibenzofuran	132-64-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dibenzofuran	132-64-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dibenzofuran	132-64-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dibenzofuran	132-64-9	0.15	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.28	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.056	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.068	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.11	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.28	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.056	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.068	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.11	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.26	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.063	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.1	U	SEMIVOLATILES

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Dichlorobenzidine, 3,3'-	91-94-1	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	1.1	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.26	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.42	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	0.18	mg/kg	0.43	J	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	J	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.69	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.14	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.17	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.27	U	SEMIVOLATILES
Dinitrobenzene, 1,3-	99-65-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.046	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.05	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.051	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.047	U	EXPLOSIVES
Dinitrophenol, 2,4-	51-28-5	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	2.2	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.52	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.84	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.052	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.056	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.057	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.053	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.046	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.05	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.051	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.047	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Fluoranthene	206-44-0	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Fluoranthene	206-44-0	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Fluoranthene	206-44-0	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Fluoranthene	206-44-0	0.191	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Fluorene	86-73-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Fluorene	86-73-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Fluorene	86-73-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Fluorene	86-73-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Hexachlorobenzene	118-74-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Hexachloroethane	67-72-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.26	U	SEMIVOLATILES
Hexachloroethane	67-72-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Hexachloroethane	67-72-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.063	U	SEMIVOLATILES
Hexachloroethane	67-72-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.1	U	SEMIVOLATILES
HMX	2691-41-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.075	U	EXPLOSIVES
HMX	2691-41-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.08	U	EXPLOSIVES
HMX	2691-41-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.082	U	EXPLOSIVES
HMX	2691-41-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.076	U	EXPLOSIVES
Indeno(1,2,3-cd)pyrene	193-39-5	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Iron	7439-89-6	21700	mg/kg	7.6		AP1-SD01	AP1007	REG	19-May-09	0	0.5	1.7		METALS
Iron	7439-89-6	19300	mg/kg	6.4		AP1-SD02	AP1008	REG	19-May-09	0	0.5	1.5		METALS
Iron	7439-89-6	9270	mg/kg	7.5		AP1-SD03	AP1012	REG	19-May-09	0	0.5	1.7		METALS
Iron	7439-89-6	21400	mg/kg	12		AP1-SD04	AP1013	REG	20-May-09	0	0.5	2.8		METALS
Isophorone	78-59-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Isophorone	78-59-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Isophorone	78-59-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Isophorone	78-59-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Lead	7439-92-1	23.7	mg/kg	7.6		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.15		METALS
Lead	7439-92-1	13	mg/kg	6.4		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.13		METALS
Lead	7439-92-1	7	mg/kg	7.5	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.15	B	METALS
Lead	7439-92-1	22.9	mg/kg	12		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.24		METALS
Magnesium	7439-95-4	9370	mg/kg	380		AP1-SD01	AP1007	REG	19-May-09	0	0.5	7.6		METALS
Magnesium	7439-95-4	4360	mg/kg	320		AP1-SD02	AP1008	REG	19-May-09	0	0.5	6.4		METALS
Magnesium	7439-95-4	4970	mg/kg	370		AP1-SD03	AP1012	REG	19-May-09	0	0.5	7.5		METALS
Magnesium	7439-95-4	1810	mg/kg	610		AP1-SD04	AP1013	REG	20-May-09	0	0.5	12		METALS
Manganese	7439-96-5	446	mg/kg	2.3		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.076		METALS
Manganese	7439-96-5	337	mg/kg	1.9		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.064		METALS
Manganese	7439-96-5	165	mg/kg	1.1		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.037		METALS
Manganese	7439-96-5	1670	mg/kg	9.1		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.3		METALS
Mercury	7439-97-6	0.14	mg/kg	0.13		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.019		METALS
Mercury	7439-97-6	0.024	mg/kg	0.1	J	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.015	B	METALS
Mercury	7439-97-6	0.021	mg/kg	0.12	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.018	B	METALS
Mercury	7439-97-6	0.11	mg/kg	0.2	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.029	B	METALS
Methylnaphthalene, 2-	91-57-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	0.616	mg/kg	0.42		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084		SEMIVOLATILES
Methylphenol, 2-	95-48-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Naphthalene	91-20-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Naphthalene	91-20-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Naphthalene	91-20-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Naphthalene	91-20-3	0.337	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Nickel	7440-02-0	26.7	mg/kg	3		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.17		METALS
Nickel	7440-02-0	21.3	mg/kg	2.5		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.15		METALS
Nickel	7440-02-0	12	mg/kg	3		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.17		METALS
Nickel	7440-02-0	25.7	mg/kg	4.8		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.28		METALS

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Nitroaniline, 2-	88-74-4	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.058	U	EXPLOSIVES
Nitrobenzene	98-95-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.062	U	EXPLOSIVES
Nitrobenzene	98-95-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.063	U	EXPLOSIVES
Nitrobenzene	98-95-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.058	U	EXPLOSIVES
Nitrobenzene	98-95-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	2.2	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.52	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.84	U	SEMIVOLATILES
Nitrotoluene, 2-	88-72-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.044	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.047	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.048	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.044	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.073	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.079	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.08	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.074	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.054	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.058	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.059	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.055	U	EXPLOSIVES
n-Nitroso-di-n-propylamine	621-64-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.087	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.1	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.17	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	2.2	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.43	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.52	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.84	U	SEMIVOLATILES
Phenanthrene	85-01-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Phenanthrene	85-01-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Phenanthrene	85-01-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Phenanthrene	85-01-8	0.306	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
Phenol	108-95-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Phenol	108-95-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Phenol	108-95-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Phenol	108-95-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Potassium	7440-09-7	1740	mg/kg	760		AP1-SD01	AP1007	REG	19-May-09	0	0.5	7.6		METALS
Potassium	7440-09-7	1170	mg/kg	640		AP1-SD02	AP1008	REG	19-May-09	0	0.5	6.4		METALS
Potassium	7440-09-7	725	mg/kg	750	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	7.5	B	METALS
Potassium	7440-09-7	1340	mg/kg	1200		AP1-SD04	AP1013	REG	20-May-09	0	0.5	12		METALS

Table E-5
Sediment Analytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	METH_DET_LIM	LAB_QUAL	USER_TEST_GROUP
Pyrene	129-00-0	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Pyrene	129-00-0	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Pyrene	129-00-0	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Pyrene	129-00-0	0.195	mg/kg	0.42	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	J	SEMIVOLATILES
RDX	121-82-4	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.074	U	EXPLOSIVES
RDX	121-82-4	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.079	U	EXPLOSIVES
RDX	121-82-4	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.081	U	EXPLOSIVES
RDX	121-82-4	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.075	U	EXPLOSIVES
Selenium	7782-49-2	0.32	mg/kg	7.6	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.24	B	METALS
Selenium	7782-49-2	0.38	mg/kg	6.4	J	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.2	B	METALS
Selenium	7782-49-2	3.75	mg/kg	7.5	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.23	U	METALS
Selenium	7782-49-2	1.3	mg/kg	12	J	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.38	B	METALS
Silver	7440-22-4	0.099	mg/kg	0.76	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.091	B	METALS
Silver	7440-22-4	0.32	mg/kg	0.64	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.076	U	METALS
Silver	7440-22-4	0.375	mg/kg	0.75	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.09	U	METALS
Silver	7440-22-4	0.6	mg/kg	1.2	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.15	U	METALS
Sodium	7440-23-5	112	mg/kg	760	J	AP1-SD01	AP1007	REG	19-May-09	0	0.5	38	B	METALS
Sodium	7440-23-5	320	mg/kg	640	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	32	U	METALS
Sodium	7440-23-5	83.1	mg/kg	750	J	AP1-SD03	AP1012	REG	19-May-09	0	0.5	37	B	METALS
Sodium	7440-23-5	600	mg/kg	1200	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	61	U	METALS
Tetryl	479-45-8	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.045	U	EXPLOSIVES
Tetryl	479-45-8	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.048	U	EXPLOSIVES
Tetryl	479-45-8	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.049	U	EXPLOSIVES
Tetryl	479-45-8	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.045	U	EXPLOSIVES
Thallium	7440-28-0	1.9	mg/kg	3.8	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	2.6	U	METALS
Thallium	7440-28-0	3.2	mg/kg	6.4	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	2.2	U	METALS
Thallium	7440-28-0	3.75	mg/kg	7.5	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	2.5	U	METALS
Thallium	7440-28-0	6	mg/kg	12	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	8.2	U	METALS
Total organic carbon	10-35-5	21000	mg/kg	0.22		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22		GEN CHEMISTRY
Total organic carbon	10-35-5	43000	mg/kg	0.8		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.8		GEN CHEMISTRY
Trichlorobenzene, 1,2,4-	120-82-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.22	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.043	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.052	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.084	U	SEMIVOLATILES
Trinitrobenzene, 1,3,5-	99-35-4	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.044	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.047	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.048	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.044	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.044	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.047	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.048	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.044	U	EXPLOSIVES
Vanadium	7440-62-2	21.9	mg/kg	3.8		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.05		METALS
Vanadium	7440-62-2	19.2	mg/kg	3.2		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.042		METALS
Vanadium	7440-62-2	12.4	mg/kg	3.7		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.049		METALS
Vanadium	7440-62-2	25.5	mg/kg	6.1		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.08		METALS
Zinc	7440-66-6	98.9	mg/kg	1.5		AP1-SD01	AP1007	REG	19-May-09	0	0.5	0.29		METALS
Zinc	7440-66-6	45.3	mg/kg	1.3		AP1-SD02	AP1008	REG	19-May-09	0	0.5	0.24		METALS
Zinc	7440-66-6	33.3	mg/kg	1.5		AP1-SD03	AP1012	REG	19-May-09	0	0.5	0.28		METALS
Zinc	7440-66-6	137	mg/kg	2.4		AP1-SD04	AP1013	REG	20-May-09	0	0.5	0.46		METALS

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Aluminum	7429-90-5	83.8	ug/L	200	J	AP1-SW01	AP2007	REG	19-May-09	11	N	B	METALS
Aluminum	7429-90-5	31.8	ug/L	200	J	AP1-SW02	AP2008	REG	19-May-09	11	N	B	METALS
Aluminum	7429-90-5	31.9	ug/L	200	J	AP1-SW03	AP2012	REG	19-May-09	11	N	B	METALS
Aluminum	7429-90-5	8770	ug/L	200		AP1-SW04	AP2013	REG	20-May-09	11	N		METALS
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.048	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.048	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.048	N	U	EXPLOSIVES
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.048	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.074	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.073	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.073	N	U	EXPLOSIVES
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.073	N	U	EXPLOSIVES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW01	AP2007	REG	19-May-09	4.5	N	U	METALS
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW02	AP2008	REG	19-May-09	4.5	N	U	METALS
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW03	AP2012	REG	19-May-09	4.5	N	U	METALS
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW04	AP2013	REG	20-May-09	4.5	N	U	METALS
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.24	N	U	PEST/PCB
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.38	N	U	PEST/PCB
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.38	N	U	PEST/PCB
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.38	N	U	PEST/PCB
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.24	N	U	PEST/PCB
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.24	N	U	PEST/PCB
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.24	N	U	PEST/PCB

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW01	AP2007	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW02	AP2008	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW03	AP2012	REG	19-May-09	0.24	N	U	PEST/PCB
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW04	AP2013	REG	20-May-09	0.24	N	U	PEST/PCB
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	3.6	N	U	METALS
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	3.6	N	U	METALS
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	3.6	N	U	METALS
Arsenic	7440-38-2	8.3	ug/L	10	J	AP1-SW04	AP2013	REG	20-May-09	3.6	N	B	METALS
Barium	7440-39-3	36.6	ug/L	200	J	AP1-SW01	AP2007	REG	19-May-09	5	N	B	METALS
Barium	7440-39-3	33.8	ug/L	200	J	AP1-SW02	AP2008	REG	19-May-09	5	N	B	METALS
Barium	7440-39-3	31.9	ug/L	200	J	AP1-SW03	AP2012	REG	19-May-09	5	N	B	METALS
Barium	7440-39-3	80	ug/L	200	J	AP1-SW04	AP2013	REG	20-May-09	5	N	B	METALS
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW01	AP2007	REG	19-May-09	10	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW02	AP2008	REG	19-May-09	10	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW03	AP2012	REG	19-May-09	10	N	U	SEMIVOLATILES
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW04	AP2013	REG	20-May-09	10	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	METALS
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	METALS
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	METALS
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	METALS
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES

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PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	METALS
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	METALS
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	METALS
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	METALS
Calcium	7440-70-2	145000	ug/L	1000		AP1-SW01	AP2007	REG	19-May-09	100	N		METALS
Calcium	7440-70-2	143000	ug/L	1000		AP1-SW02	AP2008	REG	19-May-09	100	N		METALS
Calcium	7440-70-2	139000	ug/L	1000		AP1-SW03	AP2012	REG	19-May-09	100	N		METALS
Calcium	7440-70-2	222000	ug/L	1000		AP1-SW04	AP2013	REG	20-May-09	100	N		METALS
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.2	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	1.6	N	U	METALS
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	1.6	N	U	METALS
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	1.6	N	U	METALS
Chromium	7440-47-3	13.9	ug/L	10		AP1-SW04	AP2013	REG	20-May-09	1.6	N		METALS
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW01	AP2007	REG	19-May-09	0.83	N	U	METALS
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW02	AP2008	REG	19-May-09	0.83	N	U	METALS
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW03	AP2012	REG	19-May-09	0.83	N	U	METALS
Cobalt	7440-48-4	6.9	ug/L	50	J	AP1-SW04	AP2013	REG	20-May-09	0.83	N	B	METALS

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PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW01	AP2007	REG	19-May-09	2.1	N	U	METALS
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW02	AP2008	REG	19-May-09	2.1	N	U	METALS
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW03	AP2012	REG	19-May-09	2.1	N	U	METALS
Copper	7440-50-8	19.2	ug/L	25	J	AP1-SW04	AP2013	REG	20-May-09	2.1	N	B	METALS
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.3	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.2	N	U	SEMIVOLATILES
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.2	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	4	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	4	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	4	N	U	SEMIVOLATILES
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	4	N	U	SEMIVOLATILES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.049	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.049	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.049	N	U	EXPLOSIVES
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.049	N	U	EXPLOSIVES

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW01	AP2007	REG	19-May-09	10	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW02	AP2008	REG	19-May-09	10	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW03	AP2012	REG	19-May-09	10	N	U	SEMIVOLATILES
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW04	AP2013	REG	20-May-09	10	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.062	N	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.062	N	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.062	N	U	EXPLOSIVES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.062	N	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.089	N	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.089	N	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.089	N	U	EXPLOSIVES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.089	N	U	EXPLOSIVES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.5	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.5	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.5	N	U	SEMIVOLATILES
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.5	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	2.5	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.3	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	2.5	N	U	SEMIVOLATILES
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	2.5	N	U	SEMIVOLATILES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.1	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.1	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.1	N	U	EXPLOSIVES
HMX	2691-41-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.1	N	U	EXPLOSIVES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.1	N	U	SEMIVOLATILES
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.1	N	U	SEMIVOLATILES

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Iron	7439-89-6	31.1	ug/L	300	J	AP1-SW01	AP2007	REG	19-May-09	23	N	B	METALS
Iron	7439-89-6	150	ug/L	300	U	AP1-SW02	AP2008	REG	19-May-09	23	N	U	METALS
Iron	7439-89-6	26.6	ug/L	300	J	AP1-SW03	AP2012	REG	19-May-09	23	N	B	METALS
Iron	7439-89-6	15100	ug/L	300		AP1-SW04	AP2013	REG	20-May-09	23	N		METALS
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Lead	7439-92-1	2.1	ug/L	10	J	AP1-SW01	AP2007	REG	19-May-09	2	N	B	METALS
Lead	7439-92-1	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	METALS
Lead	7439-92-1	2	ug/L	10	J	AP1-SW03	AP2012	REG	19-May-09	2	N	B	METALS
Lead	7439-92-1	15	ug/L	10		AP1-SW04	AP2013	REG	20-May-09	2	N		METALS
Magnesium	7439-95-4	26200	ug/L	5000		AP1-SW01	AP2007	REG	19-May-09	100	N		METALS
Magnesium	7439-95-4	26600	ug/L	5000		AP1-SW02	AP2008	REG	19-May-09	100	N		METALS
Magnesium	7439-95-4	26300	ug/L	5000		AP1-SW03	AP2012	REG	19-May-09	100	N		METALS
Magnesium	7439-95-4	36900	ug/L	5000		AP1-SW04	AP2013	REG	20-May-09	100	N		METALS
Manganese	7439-96-5	488	ug/L	15		AP1-SW01	AP2007	REG	19-May-09	0.5	N		METALS
Manganese	7439-96-5	396	ug/L	15		AP1-SW02	AP2008	REG	19-May-09	0.5	N		METALS
Manganese	7439-96-5	247	ug/L	15		AP1-SW03	AP2012	REG	19-May-09	0.5	N		METALS
Manganese	7439-96-5	836	ug/L	15		AP1-SW04	AP2013	REG	20-May-09	0.5	N		METALS
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW01	AP2007	REG	19-May-09	0.14	N	U	METALS
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW02	AP2008	REG	19-May-09	0.14	N	U	METALS
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW03	AP2012	REG	19-May-09	0.14	N	U	METALS
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW04	AP2013	REG	20-May-09	0.14	N	U	METALS
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW01	AP2007	REG	19-May-09	2.3	N	U	METALS
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW02	AP2008	REG	19-May-09	2.3	N	U	METALS
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW03	AP2012	REG	19-May-09	2.3	N	U	METALS
Nickel	7440-02-0	26.2	ug/L	40	J	AP1-SW04	AP2013	REG	20-May-09	2.3	N	B	METALS
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.048	N	U	EXPLOSIVES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.048	N	U	EXPLOSIVES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.048	N	U	EXPLOSIVES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Nitrobenzene	98-95-3	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.048	N	U	EXPLOSIVES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.3	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW01	AP2007	REG	19-May-09	10	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW02	AP2008	REG	19-May-09	10	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW03	AP2012	REG	19-May-09	10	N	U	SEMIVOLATILES
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW04	AP2013	REG	20-May-09	10	N	U	SEMIVOLATILES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.062	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.061	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.061	N	U	EXPLOSIVES
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.061	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.093	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.092	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.092	N	U	EXPLOSIVES
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.092	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.073	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.072	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.072	N	U	EXPLOSIVES
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.072	N	U	EXPLOSIVES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	2	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	2	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	2	N	U	SEMIVOLATILES
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	2	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW01	AP2007	REG	19-May-09	10	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW02	AP2008	REG	19-May-09	10	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW03	AP2012	REG	19-May-09	10	N	U	SEMIVOLATILES
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW04	AP2013	REG	20-May-09	10	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Potassium	7440-09-7	2170	ug/L	10000	J	AP1-SW01	AP2007	REG	19-May-09	100	N	B	METALS
Potassium	7440-09-7	2040	ug/L	10000	J	AP1-SW02	AP2008	REG	19-May-09	100	N	B	METALS
Potassium	7440-09-7	2030	ug/L	10000	J	AP1-SW03	AP2012	REG	19-May-09	100	N	B	METALS
Potassium	7440-09-7	11800	ug/L	10000		AP1-SW04	AP2013	REG	20-May-09	100	N		METALS
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.072	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.071	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.071	N	U	EXPLOSIVES
RDX	121-82-4	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.071	N	U	EXPLOSIVES

Table E-6
Surface Water Analaytical Data Used in Ash Pit 1 Baseline Human Health Risk Assessment

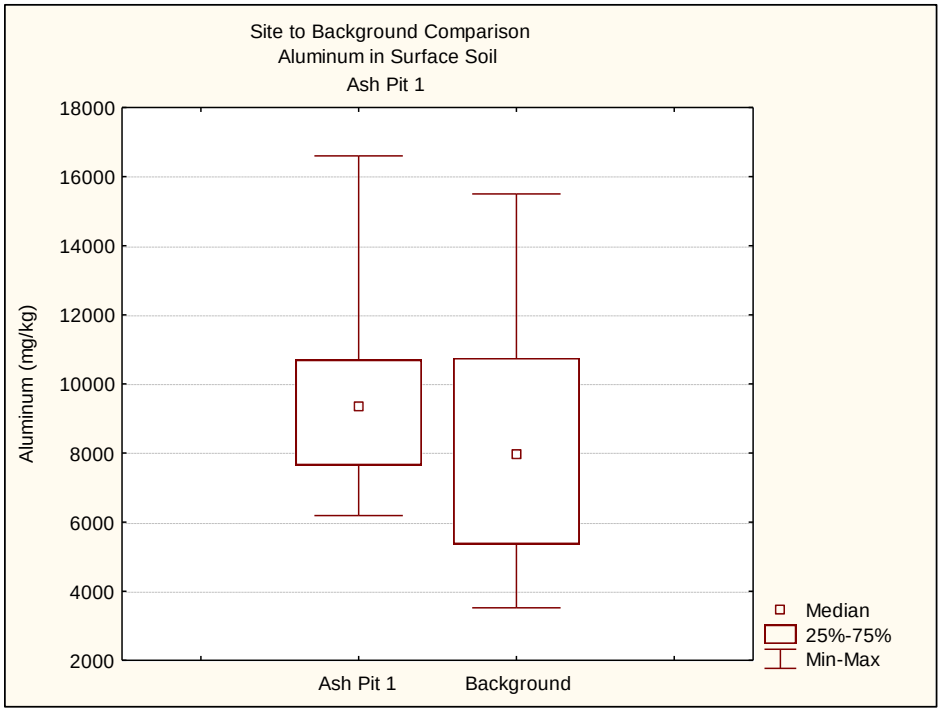
PARAMETER	CASNUM	RES	UNIT	REP_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	PURPOSE	SAMPLE_DATE	METH_DET_LIM	FILTERED	LAB_QUAL	USER_TEST_GROUP
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	3.1	N	U	METALS
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	3.1	N	U	METALS
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	3.1	N	U	METALS
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	3.1	N	U	METALS
Silver	7440-22-4	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	1.2	N	U	METALS
Silver	7440-22-4	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	1.2	N	U	METALS
Silver	7440-22-4	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	1.2	N	U	METALS
Silver	7440-22-4	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	1.2	N	U	METALS
Sodium	7440-23-5	6400	ug/L	10000	J	AP1-SW01	AP2007	REG	19-May-09	500	N	B	METALS
Sodium	7440-23-5	7050	ug/L	10000	J	AP1-SW02	AP2008	REG	19-May-09	500	N	B	METALS
Sodium	7440-23-5	6850	ug/L	10000	J	AP1-SW03	AP2012	REG	19-May-09	500	N	B	METALS
Sodium	7440-23-5	9140	ug/L	10000	J	AP1-SW04	AP2013	REG	20-May-09	500	N	B	METALS
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.075	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.074	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.074	N	U	EXPLOSIVES
Tetryl	479-45-8	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.074	N	U	EXPLOSIVES
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW01	AP2007	REG	19-May-09	3.4	N	U	METALS
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW02	AP2008	REG	19-May-09	3.4	N	U	METALS
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW03	AP2012	REG	19-May-09	3.4	N	U	METALS
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW04	AP2013	REG	20-May-09	3.4	N	U	METALS
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1	N	U	SEMIVOLATILES
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW01	AP2007	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW02	AP2008	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW03	AP2012	REG	19-May-09	1.4	N	U	SEMIVOLATILES
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW04	AP2013	REG	20-May-09	1.4	N	U	SEMIVOLATILES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.048	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.048	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.048	N	U	EXPLOSIVES
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.048	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW01	AP2007	REG	19-May-09	0.066	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW02	AP2008	REG	19-May-09	0.066	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW03	AP2012	REG	19-May-09	0.066	N	U	EXPLOSIVES
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	REG	20-May-09	0.066	N	U	EXPLOSIVES
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW01	AP2007	REG	19-May-09	0.66	N	U	METALS
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW02	AP2008	REG	19-May-09	0.66	N	U	METALS
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW03	AP2012	REG	19-May-09	0.66	N	U	METALS
Vanadium	7440-62-2	20	ug/L	50	J	AP1-SW04	AP2013	REG	20-May-09	0.66	N	B	METALS
Zinc	7440-66-6	13.2	ug/L	20	J	AP1-SW01	AP2007	REG	19-May-09	3.8	N	B	METALS
Zinc	7440-66-6	9.6	ug/L	20	J	AP1-SW02	AP2008	REG	19-May-09	3.8	N	B	METALS
Zinc	7440-66-6	10.8	ug/L	20	J	AP1-SW03	AP2012	REG	19-May-09	3.8	N	B	METALS
Zinc	7440-66-6	93.2	ug/L	20		AP1-SW04	AP2013	REG	20-May-09	3.8	N		METALS

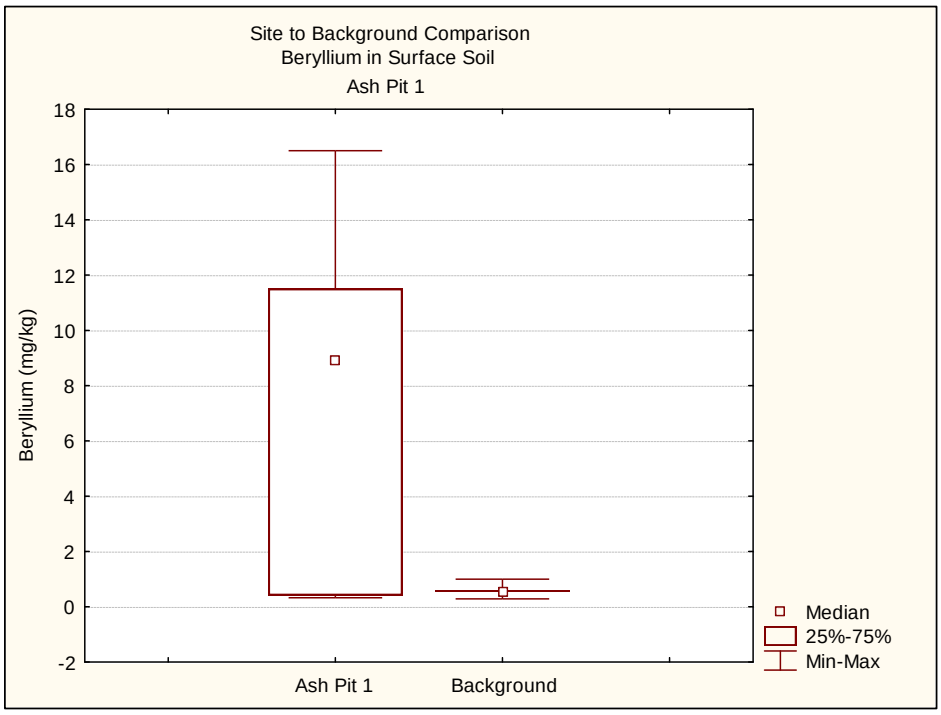
APPENDIX F

WILCOXON RANK SUM STATISTICAL TEST OUTPUT

Site to Background Evaluation for Metals in Surface Soil - AP 1

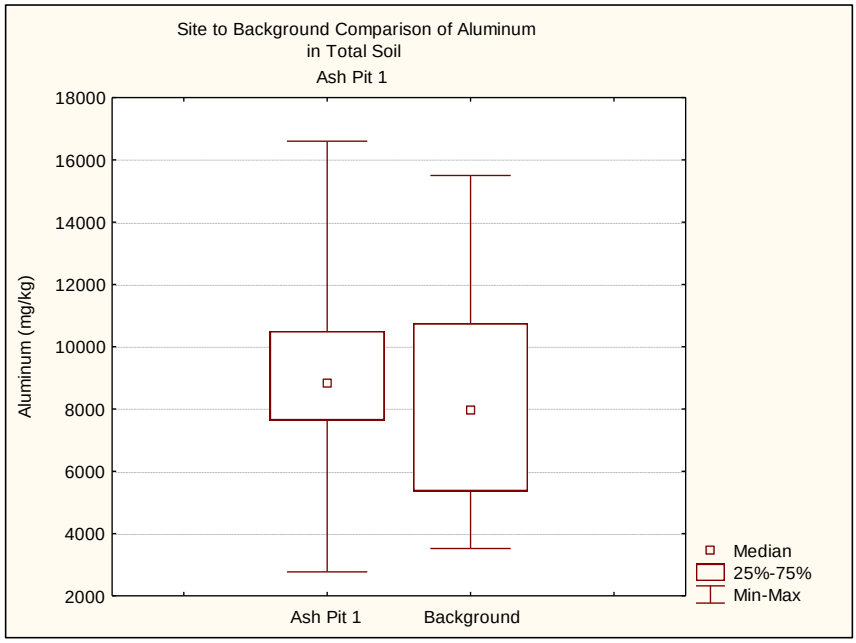
	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Aluminum	190.0000	135.0000	57.00000	1.142249	0.253351	1.142469	0.253260	13	12	0.270124
Beryllium	336.0000	405.0000	80.00000	2.538462	0.011135	2.563549	0.010361	13	25	0.010261

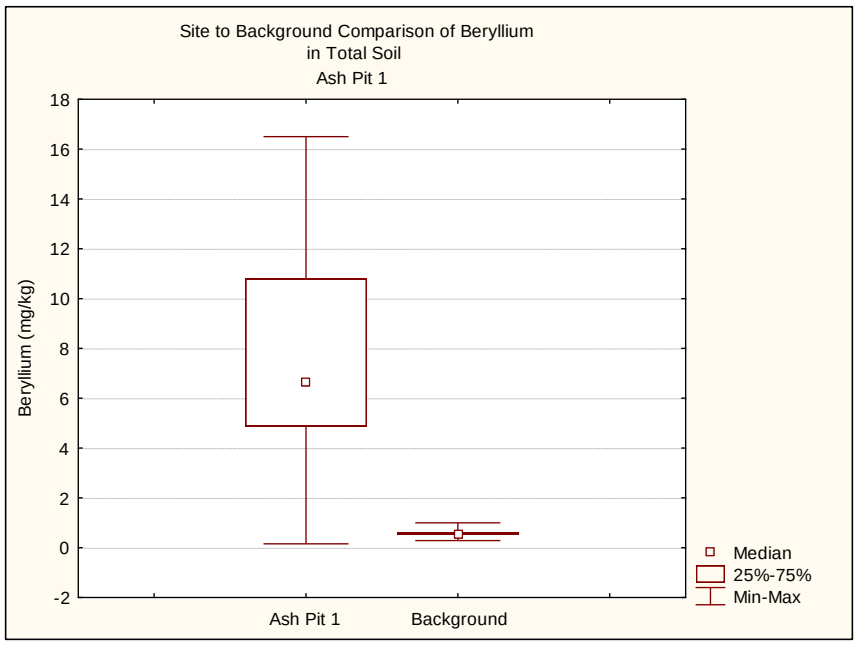


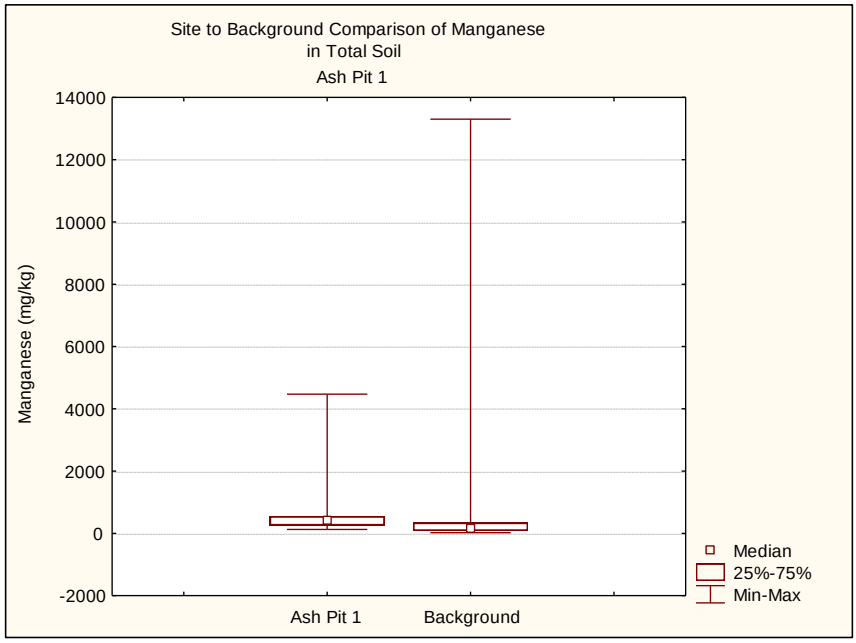


Site to Background Evaluation for Metals in Total Soil - AP 1

	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Aluminum	674.500	228.5000	150.5000	0.821348	0.411449	0.821414	0.411411	30	12	0.416631
Beryllium	1110.000	430.0000	105.0000	4.563833	0.000005	4.578640	0.000005	30	25	0.000001
Manganese	1068.000	528.0000	177.0000	3.499335	0.000466	3.499395	0.000466	30	26	0.000329






Site to Background Comparison of Manganese
in Total Soil
Ash Pit 1
Manganese (mg/kg)
14000
12000
10000
8000
6000
4000
2000
0
-2000
Ash Pit 1
Background
Median
25%-75%
Min-Max

RESPONSE TO COMMENTS

Response to External Comments
Draft Baseline Human Health Risk Assessment and
Screening-Level Ecological Risk Assessment,
Ash Pit 1 and Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio,
Dated December 20, 2010
FUDS Project No. G05OH001821

Note that the following comments reference the Baseline Human Health Risk Assessment (BHHRA) for Ash Pit 1 (AP1) and Ash Pit 3 (AP3) and the Screening-Level Ecological Risk Assessment (SLERA) for AP1 and Ash Pit 3 AP3, each of which was issued as a combined AP1/AP3 report. Please note that the U.S. Army Corps of Engineers has decided to issue two separate BHHRA reports, one for AP1 and one for AP3, rather than the combined report issued previously. The AP1 and AP3 SLERAs are likewise being issued as two separate reports.

Comments by Janusz Byczkowski, Ph.D., Ohio Environmental Protection Agency (OEPA) Toxicologist, received February 17, 2011.

Comment 1: **BHHRA Executive Summary AP3 P. ES-5 L# 1 – 7 S. 7.3 P. 7-4 L# 24 and P. 7-5 L# 4. <u>This document states:</u> "… *ILCR = 1E-6 (excluding background-related arsenic)* […] *ILCR = 3E-6 (excluding background-related arsenic)*…"and then "…*apparent background-related* manganese […] *appropriately excluded* […] *background-related contribution of arsenic* […] *appropriately excluded*…" While in the Section 2.4.3.1 (P. 2-8) at least there is a sentence, that background "…*method* […] *differs from that shown in current OEPA (2004a) guidance*…" there is no such an explanation provided either in *Executive Summary,* in *Introduction*, or in *Recommendations*. To the contrary, in the *Introduction* (Sect. 1.5, P. 1-5; L# 17) this document states that "…*The BHHRA was performed consistent with* […] *Ohio Environmental Protection Agency (OEPA) guidance*…" and then (P. ES-6, L# 24) "…*background-related contributions of arsenic in AP3 soil are appropriately excluded*…" Since the *Executive Summary, Introduction* and *Recommendations,* are the parts of the document which probably will be the most read by the public, a detailed rationale for deviation from the current OEPA-DERR standard risk assessment guidance should be included as a part of the introduction of the BHHRA document. I suggest a revision of these Documents, which should follow the suggestions listed below:**

a. On *Distribution Lists* (BHHRA, SLERA) please correct the address of Janusz Z. Byczkowski.

b. Please emphasize in *Executive Summary* that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification in the *Introduction*.

Response 1: a. The corrected address shall be used for future deliverables:

Janusz Z. Byczkowski, Ph.D., D.Sc., DABT.
Div. Emergency and Remedial Response
Lazarus Government Ctr.
P.O. Box 1049
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Columbus, OH 43216-1049

b. It is agreed that it is possible that certain stakeholders may only read the executive summary of this document. In the executive summary on page ES-3, 1st full paragraph, we will add text stating that the standard steps of risk assessment, data analysis, exposure assessment, toxicity assessment, risk characterization, uncertainty analysis were executed in the risk assessment. Data analysis for inorganic constituents differs from OEPA-DERR 2004, and is further described in Section 2.4.3.1 Background Screening of Inorganics.

Comment 2: **BHHRA S. 3.2.1 P. 3-19 L# 17 and P. 3-20 L# 3 Also, Tables 2-6 to 2-9; 2-11; 2-13; 2-14; and Appendix B. This document states: "…*One-half the reporting limit is used as the ProUCL input concentration for nondetects*…" The ProUCL ver 4.0.(05) should be used for modeling/calculating reasonable maximum exposure (RMEs) with 100% reporting limit (RL) as input concentration for nondetects (but not for screening, or calculations of background concentration). For screening- selecting COPCs, on the other hand, it is appropriate to use the MAXIMUM concentration in each medium or 1/2 of the Reporting Limit (RL) if the nondetect RL exceeds the toxicity-based screening concentration (=0.1 x RSL for non-carcinogenic or 1.0 x RSL for carcinogenic chemicals). Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: Maximum detected concentrations (MDC) were used in the data analysis screening portion of the risk assessment. The exposure point concentration (EPC) protocol used in the BHHRA is consistent with that which has been performed for PBOW human health and ecological risk assessments for the past decade, consistent with other FUDS assessments across the country and consistent with RAGS Part A (EPA 1989). PBOW EPC protocol was based on RAGS Part A Chapter 5 Data Evaluation Section which say to use ½ the quantitation limit for non-detect results if there is reason to believe that the chemical present in a sample. Quantitation limit is further defined as the lowest level at which a chemical can be accurately reproducibly quantified. This guidance even recommends that individual samples with elevated RLs be excluded from the quantitative risk assessment.

The ProUCL Version 4.00.05 05 User's Guide (EPA, 2010a) states that the full detection limit should be used rather than ½ the detection limit. Section

1.12 of the ProUCL User's Guide cautions that ProUCL does not make distinctions between MDLs, adjusted MDLs, sample quantitation limits, or instrument detection limits, and that, "It is the user's responsibility to supply correct numerical values (should be entered as reported detection limit value) for ND observations in the data set…" With this responsibility in mind, it must be recognized that the RL is not a detection limit, but is a limit of quantitation, which is defined as the concentration at which an analyte can be reported with a specified degree of accuracy (generally 20 percent, depending on the method). The method detection limit (MDL), however, is a true sample-specific detection limit reported for each sample and analyte. It is defined as the lowest concentration of an analyte that can be distinguished from a blank with 99% certainty. Note that the RL is the MDL multiplied by a factor of 3 to 5; that is, the RL (a limit of quantitation) is 3 to 5 times higher than the MDL (detection limit). The detection limits (i.e., MDLs) are not available for some of the historical data collected prior to 2008, but the RLs are available. Use of ½ the RL is a conservative (i.e., high) estimate of the full detection limit, as ½ the RL is 1.5 to 2.5 times higher than the detection limit.

Further, the use of full RLs as "detection limits" in ProUCL is not desirable because goodness-of-fit tests used in the ProUCL upper confidence limit module are based on all values greater than the highest value identified by the ProUCL user as a "detection limit," as described in Section 4.1 of the ProUCL Version 4.00.05 Technical Guide (EPA, 2010b). For example, a hypothetical data set of n=30 may have 29 detections and a single nondetect characterized by an elevated RL value that is greater than all detected values except for 5 samples. In this case, ProUCL bases the distribution only on the 5 samples that are higher than the elevated RL. This may either limit the selection of UCL methods or may result in the selection of a distribution type that fits the 5 highest detections but is inappropriate for the rest of the sample set (i.e., the other 24 detections). As a result, a UCL value that is nonconservative may be selected because the wrong distribution type was selected by ProUCL based only on the five highest detections. Also, EPA (1989) risk assessment guidance directs that "J-" qualified data should be used to calculate the exposure point concentration based on the reported levels. Because many "J" qualified data are less than the RL (but greater than the MDL), the use of even a single RL for a nondetect result will likely eliminate the inclusion of these "J" values in the distribution fitting. Therefore, use of the RL as the "detection limit" value in ProUCL may lead to distribution testing input that eliminates the consideration of J- qualified data, which is inconsistent with the current EPA (1989) risk assessment guidance practice of assuming that J-qualified data are valid detected values.

References cited in this response:

U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.00.04 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April, EPA/600/R-07/038, April.

U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.00.04 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund***, ***Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002, May.

Comment 1: **SLERA ES. P. 1 L# 31. This document states: "*…additional screening criteria (e.g., comparison with background data…*" For comments, see above: BHHRA comment # 1. Please emphasize that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification.**

Response 1: See response to HHRA comment 1.b. Text will be added to ES-1 3rd full paragraph stating that background screening for inorganics differs from OEPA-DERR 2004. In section 2.2.3.3 Background Evaluation 2nd full paragraph, will be expanded with rationale for background inorganic screening, and that the background screening differs from OEPA-DERR 2004. In Section 2.2.3.3 a more detailed description of inorganic background screening will be included. The PBOW Project Delivery Team, including members from the U.S. Army Corps of Engineers (USACE), Nashville and Huntington Districts and their contractors, the National Aeronautics and Space Administration (NASA), and the OEPA have strived to cooperate together for more than a decade. Site-specific team agreements have been made over the years, including how background screening for inorganics. The methodology used for background screening and evaluation in the risk assessment for inorganics was previously requested by OEPA risk assessors for soil in 1999 and was again agreed to by the Project Delivery Team in 2002 for groundwater (Shaw, 2005). It has been used for all PBOW risk assessments conducted since 1999 for consistency from AOC to AOC.

Comment 2: **SLERA S. 2.2.2 P. 2-10 L#14 Also, Tables 2-9 to 2-14. This document states: "*…One-half the reporting limit is used as the ProUCL input concentration for nondetects…*" For comments, see above: BHHRA comment # 2. Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: See HHRA response #2.

Comment 3: **SLERA S.5.1 P. 5-2 L# 3 and S. 6.0 P. 6-1 L.# 11. This document states:**

"*…Thallium was a COPEC in soil at AP 3 and was only detected in 3 out of 16 soil samples (Table 2-12)…*" and then: "*…Thallium was only detected in*

***2 out of 16 samples at concentrations exceeding toxicological and background concentrations…*"**

These two statements may appear contradictory, especially that the Table 2-12 is not detailed enough to relate individual detected concentrations to toxicity values or background levels.
Please harmonize the two statements with Table 2-12.

Response 3: The statements are correct as written, as one refers to the overall detection frequency, and the other refers to the number of detections that exceed screening criteria (in looking at Table 2-12, one can see that the minimum detected thallium concentration of 0.5 mg/kg is below both the BSC and ESV). To clear up any confusion, the statement in section 5.1 will be revised consistent with the following, "Thallium was a COPEC in soil at AP3 and was only detected in 3 out of 16 soil samples, *2 of which exceeded the BSC and ESV* (Table 2-12)."

APPENDIX C

ASH PIT NO. 1 SLERA

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Final
August 2011

Screening Level Ecological Risk Assessment
Ash Pit 1

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps
of Engineers
Nashville District

FUDS Project No. G05OH001821

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Final
August 2011

Screening Level Ecological Risk Assessment
Ash Pit 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

FUDS Project No.
G05OH001821

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August 23, 2011

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Kathy McClanahan)
110 Ninth Avenue South, Room 682
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Nashville, Tennessee 37203

Submittal of the Final Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment Ash Pit 1 Former Plum Brook Ordnance Works, Sandusky, Ohio Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 Shaw is pleased to submit the Final Baseline Human Health Risk Assessment and the Final Screening Level Ecological Risk Assessment for Ash Pit 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. These reports were prepared consistent with those prepared for other PBOW sites, the agreements among the PBOW project delivery team members, and specifically the respective Ash Pit 1 Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment work plans. Responses to comments received on the draft risk assessment reports have been incorporated into the final reports and are attached to these documents. Please note that the draft risk assessment reports included the respective human health and ecological risks associated with Ash Pit 1 and Ash Pit 3. Per U.S Army Corps of Engineers request, we have separated these ash pit areas into separate reports. The Ash Pit 3 risk assessments will be submitted once the groundwater data have been collected for this site.

Enclosed for your records are four copies of these reports. Copies have also been sent to those on the distribution list as indicated for their review. As requested, the document was sent to the Center of Expertise and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

for

Steven T. Downey, PE, PMP
Project Manager

Enclosures

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DISCIPLINE SIGN-OFF REVIEW

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ecological Risk Assessment for Ash Pit 1 Remedial Investigation
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 12000000

Document Type	Identify specific section or segment covered by this checkprint	Document Origin
☐ Technical / Cost Proposal		X Originator Developed
☐ RFP		☐ Edited Standard
☐ Contract / Subcontract		☐ Client Furnished
☐ Work Plans		
☐ Report		**Document Status**
X Risk Assessment / Evaluation	Screening Level Ecological Risk Assessment Report	☐ Preliminary
☐ Specifications & Plans		☐ Internal Draft
☐ Design Calculations		☐ Draft
☐ Tables		☐ Draft Final
☐ Drawings / Figures		X Final
☐ Other:		☐ Other:

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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Screening-Level Ecological Risk Assessment
Ash Pit 1

Plum Brook Ordnance Works

Sandusky, Ohio

Prepared for:

U.S. Army Corps of Engineers
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FUDS Project No. G0OH001821
Shaw Project No. 132457

August 2011

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List of Acronyms

AP1	Ash Pit 1
ARP	assessment receptor profile
AUF	area use factor
BAF	bioaccumulation factor
BERA	baseline ecological risk assessment
bgs	below ground surface
BSC	background screening concentration
COPEC	chemical of potential ecological concern
CT	central tendency
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ESCM	ecological site conceptual model
ESV	ecological screening value
HQ	hazard quotient
IAEA	International Atomic Energy Agency
IT	IT Corporation
K_{ow}	octanol-water partition coefficient
LOAEL	lowest-observed-adverse-effect level
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NASA	National Aeronautics and Space Administration
NOAEL	no-observed-adverse-effect level
NWI	National Wetland Inventory
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
PAH	polynuclear aromatic hydrocarbons
PBOW	Plum Brook Ordnance Works
RME	reasonable maximum exposure
Shaw	Shaw Environmental, Inc.
SLERA	screening-level ecological risk assessment
TNT	trinitrotoluene

TRV	toxicity reference value
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
WRS	Wilcoxon Rank Sum

Executive Summary

Screening-level ecological risk assessments were performed to provide an estimate of current and future ecological risks associated with potential hazardous substance releases within the former Ash Pit 1 (AP1) site at Plum Brook Ordnance Works in Sandusky, Ohio. The results of the screening-level ecological risk assessments contribute to the overall characterization of the site and serve as part of the baseline used to develop, evaluate, and select appropriate remedial alternatives, if necessary. The primary objective of the assessments was to determine the potential for unacceptable risks to ecological receptors as a result of exposure to chemicals detected at the site. This objective was met by characterizing the ecological communities in the vicinity of the site, determining the particular hazardous substances being released from the site, identifying pathways for receptor exposure, and estimating the magnitude and likelihood of potential risk to identified receptors. The assessment addresses the potential for adverse effects to the vegetation, wildlife, aquatic life, and endangered and threatened species.

Vegetative communities at the site were classified during two site reconnaissance trips. AP1 is a 2-acre site that consists almost entirely of dense dogwood thickets and old fields. A small drainage channel flows adjacent to the western edge of the site from the southwest to northeast. No wetlands were formally identified at the site, although the north-central portion of AP1 was noted to be lower in elevation and characterized by hydric soils. Vegetative stress attributable to chemicals was not observed at the site during site reconnaissance trips. No threatened or endangered species were documented at AP1. Based on the site reconnaissance information, there was no indication that ecological threats exist at the site, as there was no definitive absence of biota or animal life in areas expected to support these ecological components.

The maximum detected concentrations of chemicals detected in sampled media were compared with risk-based screening ecotoxicity values during an initial screening step. Chemicals that exceeded the screening values (or for which no screening values were available) and that failed additional screening criteria (e.g., comparison with background data, nutrient status, frequency of detection, etc.) were retained as chemicals of potential ecological concern (COPEC) and assessed further. The background screening protocol, which is based on Plum Brook Project Delivery Team agreement, differs somewhat from the current Ohio Environmental Protection Agency guidance. Six chemicals in soil, nine chemicals in surface water, and seven chemicals in sediment were identified as COPECs for further evaluation. Ninety-five percent upper confidence limits were calculated for these chemicals (if appropriate) and selected as their exposure point concentrations during the subsequent stages of the risk assessment.

Eight representative receptor species that are expected to potentially reside at the site were selected as indicator species for estimating the potential effects of the COPECs. The eight species selected included the deer mouse, short-tailed shrew, Eastern cottontail rabbit, marsh wren, white-tailed deer, raccoon, red-tailed hawk, and muskrat. The raccoon and muskrat were evaluated for semiaquatic or aquatic exposure.

The assessment endpoints for AP1 were the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals. Measurement assessment endpoints, or measurable responses to stressors, included lowest-observed-adverse-effect levels and no-observed-adverse-effect levels, collectively termed toxicity endpoint values.

Measurable responses to stressors, collectively termed toxicity reference values, were selected as measurement endpoints. The most appropriate measurement endpoints were chosen based on exposure pathways as well as ecotoxicity of the contaminant. An exposure analysis combining the spatial and temporal distribution of the assessment receptors and the COPECs was performed to evaluate potential exposure. The focus of the analysis was dependent on the assessment receptors evaluated and the assessment and measurement endpoints.

The intake estimates were combined with the toxicity reference values to derive estimates of potential adverse ecological effects. The uncertainties associated with the estimation of potential adverse ecological effects were identified, with the degree of uncertainty estimated qualitatively or quantitatively and the impact of the uncertainty estimated qualitatively (overestimate or underestimate, as appropriate).

Risk characterization integrates information on exposure, exposure-effects relationships, and defined or presumed target populations. The result is an estimate of the likelihood, severity, and characteristics of adverse effects to ecological receptors resulting from exposure to environmental stressors present at the site. Qualitative and semiquantitative approaches were taken to estimate the likelihood of adverse effects occurring as a result of exposure of the selected site receptors to chemicals.

For the semiquantitative predictive assessment, toxicity reference values and exposure rates were calculated and used to generate hazard quotients by dividing the receptor exposure rate for each chemical by the calculated toxicity reference values. Hazard quotients are a means of estimating

the potential for adverse effects to organisms at a contaminated site and for assessing the potential for toxicological effects to occur.

For soil, terrestrial invertebrates and plants may have slightly elevated hazard based upon the exceedance of ecological benchmarks. However, only six chemicals in AP1 soil exceeded benchmarks, and the concentrations associated with these exceedances were not highly elevated. Given the conservative nature of benchmark values, it is unlikely that these communities are adversely impacted at the site. Ecological hazard from soil was primarily evaluated using food chain models for the selected terrestrial assessment receptors (i.e., deer mouse, short-tailed shrew, Eastern cottontail rabbit, marsh wren, white-tailed deer, raccoon, and red-tailed hawk). No chemicals in soil exceeded the threshold value of 1 for AP1. Therefore, the potential for adverse ecological impacts associated with chemicals detected in soil is considered to be minor at this site.

For surface water and sediment, benthic invertebrates and plants may have slightly elevated hazard based upon the exceedance of ecological benchmarks. However, due to the limited aquatic habitat present at the site and the limited number of exceedances, it is unlikely that these communities are significantly impacted. Ecological hazard from surface water and sediment was primarily evaluated using a food chain model for the selected aquatic assessment receptors (i.e., the raccoon and muskrat) at AP1. Based on the food chain model results, the aquatic receptors were not predicted to have elevated hazards from exposure to chemicals in sediment or surface water at the site.

Based on the findings of the screening-level ecological risk assessment, the potential for adverse effects to populations of ecological receptors exposed to chemicals in soil, surface water, and sediment at AP1 is expected to be very low. No chemicals at this site are recommended for further evaluation for ecological purposes alone.

It is noted that the human health risk assessment recommends no further investigation or other actions at AP1 based on human health concerns. Therefore, no further investigation or other actions are recommended at this site based on either human health or ecological receptors.

1.0 Introduction

This screening-level ecological risk assessment (SLERA) evaluates the potential for adverse effects posed to ecological receptors from potential releases at the former Ash Pit 1 (AP1) at the former Plum Brook Ordnance Works (PBOW). This SLERA was performed as described in the work plan for this site (Shaw Environmental, Inc. [Shaw], 2009), with some modifications made to accommodate current practices in the field of ecological risk assessment. This document is consistent with the ecological risk assessment process described in U.S. Environmental Protection Agency (EPA) guidance (e.g., EPA [1997]) and Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response (OEPA, 2008) guidance, as well as with the procedures established in previous ecological risk assessments performed at PBOW (e.g., IT Corporation [IT], 2001a; Shaw, 2010).

This work is being conducted by Shaw for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites and managed by the USACE Huntington District, with technical oversight provided by the USACE Nashville District.

1.1 Facility Description and Location

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene, and pentolite (USACE, 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNT Area A, TNT Area B, and TNT Area C. Twelve process lines were used in the manufacture

of TNT, including four lines at TNT Area A, three lines at TNT Area B, and five lines at TNT Area C.

After plant operations ceased, the manufacturing process lines were decontaminated by the War Department in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After decontamination, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration after it was certified by the U.S. Army to be decontaminated. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the Plum Brook depot areas, which consist of approximately 2,800 acres. The Department of the Army re-acquired the 3,230 acres in 1954 and performed remedial efforts from the mid-1950s until 1963. In 1955, the Army completed further decontamination of manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody of the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; and removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were likewise buried. All materials, including the soil in those areas, were flashed. The area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc., 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the facility are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The General Services

Administration retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. NASA currently controls approximately 6,400 acres. The details of land transactions are listed in the Site Management Plan (USACE, 1995).

1.3 Ash Pit 1 Description and History

As noted previously, PBOW was built in early 1941 and manufactured TNT, dinitrotoluene, and pentolite until 1945. Three power stations, Power House 1, Power House 2, and Power House 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main power house, a coal storage area, and an aboveground fuel storage tank. Each power house building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the power house was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each power house. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit" (USACE, 1995). This report focuses on AP1, which was associated with Power House 1.

AP1 is located in the central part of PBOW, approximately 1,100 feet west of the intersection of Maintenance Road and Taylor Road and approximately 50 feet south of Maintenance Road (Figure 1-2). AP1 is approximately 2 acres in size. During PBOW operation, AP1 received coal ash slurry generated from the boiler in the nearby power station, Power House 1. Most of this power house is now gone, but a portion of it is currently being used by NASA. In June 1999, the USACE Louisville District conducted a limited site investigation of AP1 to evaluate the potential for contamination that may have resulted from past U.S. Department of Defense activities (USACE, 2000). Based on historical information, AP1 was noted to be overgrown with thick vegetation and a thicket of shrubby trees ranging from 3 to 8 feet tall. During a field reconnaissance by Shaw and USACE personnel in April 2009, the trees (primarily gray dogwood [*Cornus racemosa*]) present in AP1 were approximately 10 feet in height. Due to the basically level terrain, the site is believed to have been backfilled and graded. USACE also noted a culvert under Maintenance Road and an associated drainage ditch approximately 5 feet due north of AP1. A larger drainage ditch located northwest of AP1 contained water that reportedly flowed in a northeast direction. During site visits in October 2008 and April 2009, USACE and Shaw personnel observed water in this ditch, but it did not appear to be flowing. Small pools of standing water was observed in the far north portion of AP1 during the April 2009 reconnaissance, especially in ruts made by vehicles and other equipment along Maintenance

Road. This standing water was not observed during site visits in September or October 2008. A culvert receives runoff from Maintenance Road, and possibly from AP1, and drains to the north under Maintenance Road.

1.4 Scope and Objectives

The objective of this SLERA is to provide an estimate of the potential for adverse ecological effects associated with contamination resulting from former PBOW activities at AP1. The results of the SLERA will contribute to the overall characterization of the site and may be used to determine the need for additional investigations or to develop, evaluate, and select appropriate remedial alternatives. Guidance documents used to perform the SLERA include the general guidelines of the *Tri-Service Procedural Guidelines for Ecological Risk Assessments* (Wentsel, et al., 1996), *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1997), *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Guidance Bulletin No. 1* (EPA, 1996), and *Guidance for Conducting Ecological Risk Assessments* (OEPA, 2008). The SLERA fits into Steps 1 and 2 of the ecological risk assessment guidance for Superfund process (EPA, 1997) and Level I through a maximum of Level III evaluation using the OEPA (2008) process.

The goal of the SLERA is to evaluate the potential for adverse ecological effects to ecological receptors from site-related contaminants at AP1. This objective is met by characterizing the ecological communities in the vicinity of the site, determining the particular contaminants present, identifying pathways for receptor exposure, and estimating the magnitude of the likelihood of potential adverse effects to identified receptors. The SLERA addresses the potential for adverse effects to the vegetation, wildlife, aquatic life (e.g., sediment-dwelling organisms), threatened and endangered species, and wetlands or other sensitive habitats associated with the site.

Concentrations of chemicals measured in relevant environmental media were used to perform a SLERA, which includes a problem formulation (Chapter 2.0); exposure characterization (Chapter 3.0); ecological effects characterization (Chapter 4.0); risk characterization (Chapter 5.0); and summary and conclusions and recommendations (Chapter 6.0). These subtasks are described in greater detail in the following sections.

The chemicals of potential ecological concern (COPEC), the ecosystems and receptors at risk, the ecotoxicity of the contaminants known or suspected to be present, and observed or anticipated ecological effects are evaluated in this SLERA. This evaluation is conducted in two steps: (1) a screening assessment step and (2) a predictive assessment step. Ecological endpoints

to be addressed in both steps are identified. The results and conclusions of the screening assessment determine whether a predictive assessment is needed. The criteria by which the need for a predictive assessment is measured are formalized as null hypotheses to be accepted (in which case a predictive assessment is not needed) or rejected (in which case a predictive assessment is needed).

2.0 Problem Formulation

The screening assessment null hypotheses are stated as follows:

- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of viable habitat for potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential exposure pathways.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential chemical stressors.

If one or more of these null hypotheses are accepted, a predictive assessment is not triggered. All four null hypotheses must be rejected for a predictive assessment to be triggered. The first three null hypotheses are tested with the results of the ecological site description, the pre-assessment reconnaissance, the documentation of potential receptors of special concern and critical habitats, and the determination of significant ecological threats (Section 2.1). The fourth null hypothesis is tested with the results of COPEC selection (Section 2.2).

If a predictive assessment is triggered, terrestrial and aquatic ecological conceptual site models are developed, as appropriate, and additional problem formulation tasks are performed as described in Sections 2.3 through 2.5.

2.1 Ecological Site Description

This section includes a general discussion of site background and the area of concern, surface water resources, wetlands, and vegetative communities; a species inventory; and a discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities. A photographic record was made during the site reconnaissance visits (Figure 2-1). Information was obtained on the presence of state- and federally listed, threatened, and endangered species; species of special concern; and wildlife and fisheries resources. A botanist searched for threatened and endangered plant species. A checklist of biological species present at the site was developed using existing site investigation reports, environmental data sources mentioned previously, and information

gathered during the site reconnaissance. Information on unique and special-concern habitats, preserves, wildlife refuge parks, and natural areas within the general vicinity was also obtained.

2.1.1 General Site Background

PBOW, approximately 6,400 acres in size, is located within the Eastern Lake Plains physiographic region of the Eastern Huron/Erie Lake Plain Ecoregion (Lafferty, 1979; Omernik, 1986). This region is generally characterized as containing flat plains as the predominant land-surface form and as having a dominant natural vegetation of elm and ash in undisturbed areas. Approximately two-thirds of Erie County was once covered by a glacial lake that produced features such as beach ridges and wave-cut cliffs. Much of the region is poorly drained due to the flat topography and low stream gradients. Many of the wetlands adjacent to Lake Erie in this region have been preserved by various federal, state, and private organizations (Peterjohn and Rice, 1991), thereby providing important wetland habitat for wildlife.

Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. Elevations range from 675 feet above mean sea level at the southwest edge of the site to 625 feet above mean sea level in the northern portion of the property at Bogart Road, resulting in an average slope of approximately 0.3 percent. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (Ohio Department of Natural Resources [ODNR], 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second-generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within a sea of agricultural land in north-central Ohio.

AP1, approximately 2 acres in size, is located in a flat depression that is lower in elevation than Maintenance Road, which borders the site to the north. Surface water drainage is generally to the north portion of the site, where a culvert diverts water underneath Maintenance Road to the unnamed ditch that flows to the northeast. A site reconnaissance was performed by Shaw ecologists on October 16, 2008 and April 27 and June 2, 2009. A photographic record of the site was prepared during these site visits and is presented as Figure 2-1. Prior to arrival at the site, Shaw personnel obtained relevant information on the site, including topographic, township, county, or other appropriate maps, which were used to determine the location of potential ecological units such as streams, creeks, ponds, grasslands, forest, and wetlands on or near the site. Additionally, the 1994 biological inventory of PBOW (NASA, 1995), which identifies and shows the locations of threatened and endangered species at PBOW, was reviewed. Shaw personnel completed a checklist similar to EPA's checklist for ecological assessment/sampling (EPA, 1997). Information from this checklist was also used to complete this chapter. The

location of known or potential contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Shaw personnel also used the reconnaissance to search for any indication of potential effects from contaminant release.

2.1.2 Surface Water

Due to the lack of topography at the site, surface water tends to pool in localized shallow depressions. Surface water was observed to be pooled at AP1 in depressions made by tire tracks and heavy equipment following sampling activities in 2009; however, such shallow pools are only present after rain events. AP1 drains to a culvert that discharges to the unnamed ditch that runs diagonally from the southwest to the northeast adjacent to the site. This shallow drainage ditch only contains water following rain events. Therefore, surface water that supports a viable aquatic ecological community does not exist within the AP1 site boundary. However, the unnamed ditch to the northwest does represent an aquatic habitat that receives runoff from, and could be impacted by, any contamination present at AP1.

2.1.3 Wetlands

According to the National Wetland Inventory (NWI) maps for the area (U.S. Fish and Wildlife Service, 2010), there are no designated wetlands at the AP1 site. It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes (such as those present at PBOW) because minor depressions often contain isolated wetlands not easily identified through interpretation of aerial photographs (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). It should also be noted that the NWI map classification may have been based on previous anthropogenic conditions.

2.1.4 Vegetative Communities

Vegetative communities at the site were classified during the site reconnaissance trips. Figure 2-2 presents a map of the vegetation communities at AP1. AP1 contains dense shrub thickets and old fields. The shrub thickets are dominated by *Cornus racemosa* (gray dogwood). A scrub/shrub wetland is found along Maintenance Road. Upland old fields with scattered areas of shrubs are also found in this area. During the June 2009 site visit, it was noted that a few small areas within AP1 were disturbed due to recent sampling activities at the site (see Photographs 5 and 6 on Figure 2-1).

A list of the plant species identified at AP1 is presented in Table 2-1.

During the site reconnaissance, the study area was examined for vegetative stress, including a search for plants displaying stunted growth, poor foliage growth, tissue discoloration, and a loss

of leaf coverage. Vegetative stress attributable to chemicals was not observed at AP1, and there was no evidence that significant ecological threats exist at the site. As noted previously, a few locations were devoid of vegetation in areas where heavy equipment had been deployed during sampling events earlier in the year (see bare areas in Photographs 5 and 6 on Figure 2-1). These bare areas were most obvious during the June 2009 site visit. Based on site reconnaissance information, AP1 represents a relatively undisturbed (albeit small) parcel of shrub-thicket habitat that is capable of supporting ecological receptors.

2.1.5 Species Inventory

Based on information from ODNR (1995) and collected during the site reconnaissance, species lists were prepared for plants, mammals, birds, reptiles, amphibians, and fish (Tables 2-1 through 2-6, respectively). Unless noted on the tables, the species listed in Tables 2-2 through 2-6 apply to the former PBOW as a whole and are not necessarily specific to AP1.

A total of 114 plant species were documented at AP1 during the spring and fall vegetation survey (Table 2-1). This total comprises approximately 27 percent of the total number of species documented at the installation either during the 1994 biological inventory (ODNR, 1995) or during vegetation surveys at other sites at the former PBOW (Appendix A).

Deer were observed immediately outside AP1 during one site visit and were the only mammal species directly observed. Based on species range maps that were available, a total of 43 species of mammals may be found in the region (Table 2-2). It is likely that other species are present but were not observed due to the short duration of the field visits. The dense shrub thickets at AP1 also helped obscure animal sign at this site.

A total of 130 species of birds are likely to be found in the region based on species range maps and field observations, and 105 species have been recorded at the former PBOW by the ODNR during their multi-year studies (Table 2-3). PBOW lies within a major migratory corridor that is used by birds travelling between their southern wintering grounds and their breeding grounds in Canada. Of the species recorded by the ODNR, 49 are neotropical migrants and would not be expected to nest at the former PBOW. Eleven bird species were documented at AP1 during the site visits performed by Shaw, and nine of these were identified as being present during the breeding season.

Of the 14 species of reptiles that may be found in the region based on species range maps, 10 species (71 percent) have been observed at the former PBOW, including turtles and snakes (ODNR, 1995; Table 2-4). No reptiles were observed during the AP1 site reconnaissance.

Of the 10 species of amphibians that may be found in the region based on species range maps, 9 species (90 percent) have been observed at the former PBOW (ODNR, 1995; Table 2-5), including salamanders, toads, and frogs. No amphibians were observed during the site reconnaissance.

According to ODNR (1995), a combination of electroshocking and seining was conducted during the field investigation that identified 14 species of fish at PBOW. Species observed included suckers, sunfish, minnows, sticklebacks, and bullheads (Table 2-6). Aquatic habitat sufficient to support fish populations is limited at AP1, and no fish were observed during site reconnaissance visits.

2.1.6 Threatened and Endangered Species Information

According to an Ohio Division of Natural Areas and Preserves review of their natural heritage maps and files (ODNR, 2010), there are records of State of Ohio threatened or endangered species within a 2-mile radius of the site (no species on the federal list were identified). These species include the following:

- Bushy aster (*Symphyotrichum dumosum*) - endangered
- Canada St. John's wort (*Hypericum canadense*) – endangered
- Flat-leaved rush (*Juncus platyphyllus*) – endangered
- Rough rattlesnake-root (*Prenanthes aspera*) – endangered
- Ashy sunflower (*Helianthus mollis*) – threatened
- Dwarf bulrush (*Lipocarpha micrantha*) – threatened
- Field sedge (*Carex conoidea*) – threatened
- Greene's rush (*Juncus greenei*) – threatened
- Slender spike-rush (*Eleocharis tenuis*) – threatened
- Southern hairy panic grass (*Panicum meridionale*) – threatened
- Thin-leaved sedge (*Carex cephaloidea*) – threatened
- Tufted fescue sedge (*Carex brevior*) – threatened
- Twisted yellow-eye-grass (*Xyris torta*) – threatened
- Upland sandpiper (*Bartramia longicauda*) – threatened.

In addition to these species, based on information contained in ODNR (1995), several species of threatened or endangered plants, potentially threatened plants, and threatened or endangered birds have been recorded at PBOW, as follows (note that the status of some of these species may have changed since the report was published):

- Grove sandwort (*Arenaria lateriflora*) - threatened
- Prairie false indigo (*Baptisia lactea*) - potentially threatened
- Broad-winged sedge (*C. alata*) - potentially threatened

- Round-fruited hedge-hyssop (*Gratiola virginiana*) - potentially threatened
- Tall St. John's wort (*H. majus*) - potentially threatened
- Virginia meadow beauty (*Rhexia virginica*) - potentially threatened
- Tall nut rush (*Scleria triglomerata*) - potentially threatened
- Lance-leaved violet (*Viola lanceolata*) - potentially threatened
- Cattle egret (*Bublucus ibis*) - endangered
- Black-crowned night heron (*Nycticorax nycticorax*) - threatened
- Trumpeter swan (*Cygnus buccinator*) - endangered
- Indiana bat (*Mytolis sodalis*) - endangered.

The site reconnaissance performed at AP1 as part of the current remedial investigation included detailed searches performed by a qualified botanist subcontractor during the October, 2008 and June, 2009 site visits. Based on the results of the site reconnaissance, no threatened or endangered plant species were found at AP1.

None of the threatened or endangered bird species listed previously would typically be expected to be found at AP1. The cattle egret, trumpeter swan, and upland sandpiper are all considered rare visitors or migrants at the former PBOW (ODNR, 1995) and have not been documented nesting within 1 mile of the site (ODNR, 2010). Upland sandpipers have been historically documented as nesting approximately 4,300 feet to the southeast of AP1 (Woischke, 2010). However, breeding populations of this species are no longer present in this area (PBOW/NASA, 2010). The black-crowned night heron, an Ohio threatened species, is a regular visitor at ponds, streams, and ditches within the former PBOW; however, it does not nest at the former PBOW (ODNR, 1995; 2010). The species is typically found near water and wetlands, and since the early 1980s, there has been a nesting colony of approximately 100 pairs located on an island in Sandusky Bay, approximately 10 miles north northwest of the study area (Peterjohn and Rice, 1991).

The Indiana bat, the only mammal in the list, has not been documented at the site and is generally not expected at PBOW because its preferred habitat (e.g., caves along streams or trees with exfoliated bark) is not present at AP1. Trees with exfoliated bark, such as shagbark or shellbark hickory, are rare or not present at the site, respectively, thereby providing little bat roosting habitat (Appendix A).

With the exception of the Erie Sand Barrens State Nature Preserve, there are no existing or proposed state nature preserves or scenic rivers near the site, and ODNR is unaware of any unique ecological sites; geological features; breeding or nonbreeding animal concentrations; champion trees; or state parks, forests, or wildlife areas within a 2-mile radius of the site (ODNR, 2010). The Erie Sand Barrens State Nature Preserve is located southwest of PBOW.

The 32-acre preserve is a remnant sand beach of Lake Warren, the fifth ancestral Lake Erie, and supports many threatened and endangered plant species such as field sedge, Least St. John's wort, dwarf bullrush, twisted yellow-eyed-grass, flat-leaved rush, bushy aster, and Virginia meadow beauty. Many of the preserve's rare plant species thrive in open windswept conditions such as those found on the sand barrens. The ODNR Division of Natural Areas and Preserves actively manages the preserve to ensure that the open wind-swept areas remain and do not become overgrown with woody vegetation.

2.1.7 Pre-Assessment Reconnaissance

Shaw ecological scientists performed site visits to AP1 on October 16, 2008 and April 27 and June 2, 2009. The primary purpose of the April site visits was to perform a habitat assessment and fauna inventory at the site, and the visits were intentionally performed during the period when birds are migrating north to their breeding areas so that transient species could be observed. The primary purposes of the June and October site visits were to perform a summer and fall walkover to identify plant species (including threatened and endangered species). During early June, breeding birds are vocalizing as they establish and defend territories, while migrants that breed further to the north have moved on. Therefore, the June visit was also used as a follow-up to the April fauna visit to identify bird species that are using the site during the breeding season. The list of plant species observed during the early summer and fall site walks is presented in Table 2-1. The bird species observed at AP1 are listed in Table 2-3.

Information obtained during the reconnaissance trips was used to select representative receptors, refine exposure scenarios for the risk assessment, and identify protected species or habitats of special concern in the study areas. Reconnaissance personnel completed a checklist similar to that on EPA's checklist for ecological assessment/sampling (EPA, 1997) and OEPA's ecological risk assessment guidance (OEPA, 2008). The locations of known or potential contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Reconnaissance personnel used the site visits to evaluate the site for more subtle clues of potential effects from contaminant release.

The methods used to characterize natural resources focused on aquatic and terrestrial resources at the site and within the immediate vicinity. General habitat maps showing the types and extent of vegetation communities present within the immediate vicinity of the site were prepared based on information collected during the site reconnaissance.

2.2 Selection of Chemicals of Potential Ecological Concern

A list of media samples used for the AP1 SLERA is presented in Table 2-7. Samples used for the SLERA consisted of historical samples supplemented with more recently collected samples whose locations were selected to close data gaps and maximize information related to possible presence and distribution of contamination at a given site. Sample locations are presented on Figure 2-3. Using the analytical data from samples on this list, a COPEC selection process was performed to develop a subset of chemicals detected at the site that are not naturally occurring or are associated with non-site-related sources. These chemicals are also present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. Screening criteria that were used to identify COPECs are described in more detail in Section 2.2.3.

2.2.1 Data Organization

Chemical analytical data, as well as all previous and ongoing investigations, were reviewed and evaluated for quality, usefulness, and uncertainty. Data identified as being of acceptable quality for use in the SLERA were summarized in a manner that presents the pertinent information to be applied in the SLERA. Any data rejected during the data evaluation as a result of the data evaluation ("R"-qualified data) were identified along with the rejection rationale. Only validated data were used in the SLERA.

The data for each chemical were sorted by medium. For ecological impacts, soil from 0 to 6 feet below ground surface (bgs) was considered. Although the 0 to 6 feet depth interval encompasses soil at depths that are not typically experienced by many ecological receptors, this interval was selected for three primary reasons: (1) to maintain consistency with other PBOW ecological risk assessments (e.g., IT [2001a]), (2) to include potential exposure to ecological receptors that may be exposed to deeper soil, and (3) to increase the size of the total soil database by including samples collected from samples up to 6 feet bgs. Therefore, COPEC selection was performed for the 0 to 6 feet interval. Chemicals that were not detected at least once in a medium were not included in the risk assessments. Available background data were determined for each medium. Potential sources of background information include data from previous and current investigations as well as monitoring wells in areas unaffected by site activities.

The analytical data included qualifiers from the analytical laboratory quality control or from the data validation process that reflect the level of confidence in the data. Some of the more common qualifiers and their meanings are as follows (EPA, 1989a):

- U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.

- J - Value is estimated and probably below the contract-required quantitation limit.
- R - Quality control indicates that the data are unusable (chemical may or may not be present).
- B - Concentration of chemical in sample is not sufficiently higher than concentration in the blank (using the “5-times, 10-times” rule).

"J"-qualified data are used in the risk assessment; "R"- and "B"-qualified data are not. The handling of "U"-qualified data (nondetects) is described in the following sections.

2.2.2 Descriptive Statistical Calculations

Because of the uncertainty associated with characterizing contamination in environmental media, both the mean and the 95 percent upper confidence limit (UCL) of the mean are usually estimated for chemicals of interest. The EPA ProUCL software (Version 4.00.05 [EPA, 2010]) was used to calculate UCLs for the data sets of all environmental media represented by at least five samples. If the data set consisted of fewer than five data points, the maximum detected concentration (MDC) was selected as the exposure point concentration (EPC). One-half the reporting limit was used as the ProUCL input concentration for nondetects.

ProUCL generates a variety of UCL estimates for each data set. Generally, the results of one or two (sometimes more) of the UCL estimates are recommended. This recommendation is based on a variety of factors, including the distribution (i.e., normal, lognormal, gamma, or not discernable) that provides the best fit, number of nondetects, size of the data set, and skewness. In general, the UCL recommended by ProUCL will be selected as the EPC. Occasionally, ProUCL will recommend the 97.5 or 99 percent UCL on the arithmetic mean estimated by the Chebyshev method. In these cases, the 95 percent UCL estimated by the Chebyshev method was selected as the EPC because this is more consistent with the intent of the reasonable maximum exposure paradigm as defined by EPA (1989a; 2002).

Analytical data from field duplicates were joined with parent sample results to yield one result for use in the generation of mean and UCL concentrations, as follows:

- The average of field duplicate and parent sample was used if both were positive detections or if both were nondetects.
- The detected value was used if one sample was a positive detection and the other was nondetect.

The UCL generated by ProUCL or the MDC, whichever is smaller, was selected as the EPC, and this value is understood to represent a conservative estimate of average for use in the risk assessment. Unusually high detected values were retained in the calculation of the UCL concentration. Inclusion of these high values increases the statistical variability and the overall conservativeness of the risk estimate.

2.2.3 COPEC Selection Criteria

The criteria used to identify COPECs in the SLERA are described in the following sections.

2.2.3.1 Comparison to Ecological Screening Values

MDCs of chemicals detected in various media were compared with ecological screening values (ESV) for ecological endpoints following recommendations received from OEPA and as discussed in *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Bulletin No. 1* (EPA, 1996). Chemicals that exceed the ESVs or for which no ESVs are available were retained as COPECs if other COPEC selection criteria were also met. The following ESVs or ESV hierarchy (as noted), were used for the ecological evaluation:

- ***Soil.*** Soil screening values were selected using the following hierarchy: (1) EPA ecological soil screening levels (EPA, 2008), (2) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et. al., 1997a), (3) EPA Region 5 ecological screening levels (note: these values were previously known as ecological data quality levels) (EPA, 2003), (4) *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process* (Efroymson, et al., 1997b), and (5) *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants* (Efroymson, et al., 1997c). It should be noted that effects on heterotrophic processes may not be relevant to ecological receptors of concern at the site.

- ***Surface Water.*** The lowest surface water screening value was selected from the following three sources: (1) OEPA Water Quality Criteria (OAC Chapter 3745-1) for the protection of aquatic life, (2) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et al., 1997a), and (3) EPA Region 5 ecological screening levels (EPA, 2003). Because OEPA water quality criteria do not consider food-chain effects, a hierarchy could potentially eliminate important surface water COPECs.

- ***Sediment.*** Sediment screening values were selected using the following hierarchy: (1) Consensus-based threshold effect concentration values (MacDonald, et al., 2000), (2) EPA Region 5 ecological screening levels (EPA, 2003), (4) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et al., 1997a), and (5) *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* (Ontario Ministry of the Environment and Energy, 1993).

The development of the ESVs used for the former PBOW SLERA is presented in Appendix B.

2.2.3.2 Frequency of Detection

Chemicals that are detected infrequently may be artifacts in the data that may not reflect site-related activity or disposal practices. These chemicals are not evaluated further in the risk evaluation. Generally, chemicals that are detected only at low concentrations in less than 5 percent of the samples from a given medium are dropped from further consideration unless their presence is expected based on historical information about the site. Chemicals detected infrequently at elevated concentrations as compared with applicable risk-based thresholds may identify the existence of "hot spots" and have been retained in the evaluation unless other information exists to suggest that their presence is unlikely to be related to site activities.

2.2.3.3 Background Evaluation

Chemical concentrations were compared to site-specific background concentrations (see next paragraph for details) as an indication of whether a chemical is present from site-related activity or as natural background. This comparison is generally valid for inorganic chemicals but not for organic chemicals, because inorganic chemicals are naturally occurring and most organic chemicals are not. Statistical techniques are used as tools to aid the exercise of professional judgment in resolving site-related issues for metals, because metals are naturally present in most environmental media. The statistical techniques generally involve comparing the site data with background data. Background data are only available for soil at PBOW. For this SLERA, background soil values were also compared to concentrations detected in sediment samples at AP1. Sediment samples were collected from the unnamed ditch adjacent to AP1. The bottom of this ditch is most likely composed of native soil and accumulates sediment as a result of overland runoff from adjacent soils. Background data do not exist for surface water; therefore, a statistical background evaluation for this medium cannot be performed.

The first statistical technique used for the background screen is the comparison of the MDC of the site data set to the PBOW background screening concentration (BSC). BSCs are considered representative concentrations of naturally occurring inorganic constituents; therefore, a comparison between the BSC and concentrations detected on site provides an indication of whether exposure to on-site media exceeds ambient levels. The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998). It is noted that the method agreed upon for the development of BSCs, as recorded in the September 11, 2002 PBOW Team Meeting minutes, differs from that shown in current OEPA (2004) guidance. This PBOW Team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2004) guidance. The background soil samples were

collected from near the property boundary, away from any potential source areas. BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC of the concentrations found in these background soil samples or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (Shaw, 2005). The upper tolerance limit is the concentration, with a probability of 0.95 (or a confidence of 95 percent), that would capture (or cover) 95 percent of background samples if a larger number of samples were collected. Chemicals with MDCs less than their respective BSCs are eliminated from further consideration. If the MDC exceeds the BSC, the chemical may be retained as a COPEC, or a different statistical analysis may be performed to determine if the background data and the site data are drawn from the same population. The Wilcoxon Rank Sum (WRS) test is used for this purpose.

The WRS test (also known as the Mann-Whitney U test) is described in Appendix M of Shaw (2005). WRS testing is performed for inorganic chemicals in soil whose MDCs exceed their respective BSCs and when the site and background data sets each contain less than 50 percent nondetects. The WRS test is not performed on data sets containing 50 percent or more nondetects, because the medians of such data sets are unknown and the test lacks sufficient power to yield reliable results. Likewise, the WRS test is not performed on data sets of size $n < 5$; in such cases, the test lacks sufficient power to identify differences between the two samples. Site data sets are interpreted as being significantly different from PBOW background if the associated p-level is less than 0.05. WRS statistical output and box-and-whisker plots of the various inorganic COPEC data sets are appended to the SLERA for each inorganic data set evaluated against the site background data set. Analytes shown by the WRS results to exceed background (or for which the WRS testing was not run) are assumed to be site related and retained as COPECs unless a qualitative chemical-specific explanation is presented in the uncertainties analysis as to why the analyte should not be regarded as site related. Analytes shown by the WRS results to be drawn from the same population as the background samples are assumed to be naturally occurring and are not retained as COPECs. The WRS test was performed for aluminum and nickel in soil for AP1. The WRS test was not used to compare sediment to soil concentrations. For AP1, on-site aluminum concentrations were found not to be significantly different from background at the $p = 0.05$ confidence level. For nickel, a significant difference was noted, but an inspection of the box-and-whisker plots indicates that the median on-site concentration is below background, indicating that on-site concentrations were significantly lower than background. Based on this information, both aluminum and nickel were removed as COPECs. Supporting information for the WRS test, including box-and-whisker plots, is presented in Appendix C.

Chemicals that fail the background evaluation are assumed to be site related and are not eliminated at this point of the screening process.

2.2.3.4 Essential Nutrients

Evaluating essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required nutrients. Essential nutrients such as calcium, iron, magnesium, potassium, and sodium are usually eliminated as COPECs because they are generally considered to be innocuous in environmental media. Other essential nutrients, including chloride, iodine, and phosphorus, may be eliminated as COPECs, provided that their presence in a particular medium is shown to be unlikely to cause adverse effects to biological health.

2.2.4 Summary of COPEC Selection

The results of the COPEC screening are presented in Tables 2-8 through 2-10 for soil, surface water, and sediment at AP1. The tables present the following information for each medium:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of detection limits
- Arithmetic mean (average) of site concentrations
- Distribution type
- UCL of the mean of the concentration (only for chemicals selected as COPECs)
- Appropriate ESV
- BSC
- COPEC selection conclusion: NO (with rationale for exclusion) or YES (selected).

The selected EPC is also presented for each chemical identified as a COPEC. For soil, two EPC results are presented, including a total soil EPC that represents concentrations in the 0-6 feet bgs depth range, and a surface soil EPC that represents concentrations in the 0-1 foot bgs depth range. These two sets of EPCs are used to evaluate various ecological receptors that may be exposed to different soil depths associated with their various life-history characteristics (see Section 3.1). Footnotes in each table provide the rationale for selecting or rejecting a chemical as a COPEC. In some situations, it is appropriate to reinstate as COPECs chemicals that have been eliminated using one or more of the screening criteria. Examples of these exceptions include potential breakdown products, chemicals known to have been used on site historically, chemicals with detection limits greater than the ESVs, and chemicals with high bioconcentration factors and/or bioaccumulation factors (BAF). A qualitative evaluation of the COPEC tables for soil,

surface water, and sediment was performed; based on this evaluation, no additional COPECs are recommended.

Six chemicals were identified as COPECs in soil (Table 2-8), nine were selected in surface water (Table 2-9), and seven were selected in sediment (Table 2-10) at AP1. As discussed at the beginning of Chapter 2.0, the SLERA null hypotheses are that potential for adverse ecological effects are minimal or nonexistent due to the lack of viable habitat, potential ecological receptors, potential exposure pathways, and/or potential chemical stressors. Given the selection of COPECs in multiple media, and the finding that viable habitat, potential receptors, and potential exposure pathways exist at the site, a predictive assessment is triggered for AP1. Chemicals not eliminated using the screening procedures previously presented are considered COPECs and are quantitatively evaluated in the predictive SLERA.

2.3 Ecological Endpoint (Assessment and Measurement) Identification

The first step in a predictive SLERA is the identification of assessment and measurement endpoints. The protection of ecological resources, such as habitats and species of plants and animals, is a principal motivation for conducting the SLERA. Key aspects of ecological protection are presented as policy goals. These are general goals established by legislation or agency policy that are based on societal concern for the protection of certain environmental resources. For example, environmental protection is mandated by a variety of legislation and government agency policies (e.g., the Comprehensive Environmental Response, Compensation, and Liability Act and the National Environmental Policy Act). Other legislation includes the Endangered Species Act (16 U.S. Code 1531-1544) (1993, as amended) and the Migratory Bird Treaty Act 16 (U.S. Code 703-711) (1993, as amended). To determine whether these protection goals are met at the site, assessment and measurement endpoints have been formulated to define the specific ecological values to be protected and to define the degree to which each may be protected.

Unlike the human health risk assessment process, which focuses on individual receptors, the SLERA focuses on populations or groups of interbreeding nonhuman, nondomesticated receptors. This is accomplished by selecting measurement endpoints (discussed below) that are related to parameters most likely to result in population level effects (e.g., survival, growth, or reproduction) and consideration of lowest-observed-adverse-effect levels (LOAEL) in addition to no-observed-adverse-effect level (NOAEL) endpoints (see Chapter 4.0). In the SLERA process, risks to individual receptors are assessed only if they are protected under the Endangered Species Act, are species that are candidates for protection, or are species of special concern.

Given the diversity of the biological world and the multiple values placed on it by society, there is no universally applicable list of assessment endpoints. Suggested criteria that may be considered in selecting assessment endpoints suitable for a specific ecological risk assessment are (1) ecological relevance, (2) susceptibility to the contaminant(s), (3) accessibility to prediction and/or measurement, and (4) definability in clear, operational terms (Suter, 1993). Selected assessment endpoints reflect environmental values that are protected by law, are critical resources, or have relevance to ecological functions that may be impaired. Both the entity and attribute are identified for each assessment endpoint.

Assessment endpoints are inferred from effects to one or more measurement endpoints. The measurement endpoint is a measurable response to a stressor that is related to the valued attribute of the chosen assessment endpoint. It serves as a surrogate attribute of the ecological entity of interest (or of a closely related ecological entity) that can be used to draw a predictive conclusion about the potential for effects to the assessment endpoint.

Measurement endpoints for this SLERA are based on toxicity values from the available literature and not statistical or arithmetic summaries of actual field or laboratory observations or measurements. When possible, receptors and endpoints have been concurrently selected by identifying those that are known to be adversely affected by chemicals at the site based on published literature. COPECs for those receptors and endpoints have been identified by drawing on the scientific literature to obtain information regarding potential toxic effects of site chemicals to site species. This process ensures that a conservative approach is taken in selecting endpoints and evaluating receptors that are likely to be adversely affected by the potentially most toxic chemicals at the site.

2.3.1 Assessment Endpoints

The assessment endpoints for AP1 are stated as “the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals.” The corresponding null hypothesis for each of the assessment endpoints is stated as “the presence of site contaminants within soil, surface water, sediment, vegetation, and prey will have no effect on the survival or reproductive capabilities of terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals.”

Assessment receptor species were selected based on the likelihood of finding the species at AP1. Historical information, the site reconnaissance visits, and the availability of toxicological data were used to select terrestrial and aquatic assessment receptor species. These receptors species are depicted in food web models (Figures 2-4 and 2-5). Food web models are simplified versions of the possible movement through the food chain of contaminants present or potentially present at the site. Due to lack of data for all possible species, key species have been selected to represent broad classes, or guilds.

The food web conceptual site models were developed to illustrate how the selected terrestrial and aquatic species are ecologically linked within food webs. One species was used to represent each of the major trophic levels and habitats at the site. The decision was made not to complicate the food web models with species names for organisms at the base of the food web (e.g., species names of terrestrial invertebrates). Thus, generic terrestrial invertebrates, benthic invertebrates, and aquatic invertebrates were used to represent the bottom of the food chain. For terrestrial invertebrates and plants, partitioning coefficients and simple empirical uptake models were employed to estimate COPEC concentrations within tissues (Chapter 3.0). Brief life history descriptions for the selected receptor species are provided in Appendix D.

All trophic levels may be exposed to COPECs, either by direct exposure to contaminated abiotic media or through ingestion of lower trophic level food items. Primary producers (plants) absorb COPECs (as well as nutrients) from soil and/or water. Through abiotic processes, COPECs can adsorb to the sediment and detritus particles. When these particles settle and become part of the benthic substrate, they may also become a source of COPECs to benthic communities. Various species of aquatic biota fulfill the role of aquatic herbivores (feeding on aquatic plants and suspended detritus) and predatory invertebrates (feeding on benthic invertebrate species). The combination of COPEC bioconcentration from water, ingestion of contaminated prey, and restricted ranges for aquatic organisms provides good conditions for significant bioaccumulation of COPECs. In terrestrial species, bioconcentration occurs in plants and invertebrates, and higher food chain receptors bioaccumulate COPECs through the ingestion of food items.

2.3.2 Measurement Endpoints

Measurement endpoints are frequently numerical expressions of observations (e.g., toxicity test results or community diversity indices) that can be compared statistically to detect adverse responses to a site contaminant. Examples of typical measurement endpoints include mortality, growth, or reproduction parameters in toxicity tests; individual abundance; and species diversity (EPA, 1997).

For assessments, measurable responses to stressors may include LOAELs, NOAELs, lethal concentration to 50 percent of the test population, lethal dose to 50 percent of the test population, or effective concentration for 20 percent of the test population, collectively termed toxicity reference values (TRV) (see Section 4.1 for further explanation).

2.4 Selection of Assessment Receptors

In order to focus the exposure characterization portion of the SLERA on species or components that are the most likely to be affected and on those that, if affected, are most likely to result in significant impacts to the on-site ecosystem, the selection of assessment receptors focuses on species, groups of species, or functional groups that are directly related to the assessment endpoints previously identified (Section 2.3.1).

Site biota were organized into major functional groups. For terrestrial communities, the major groups are plants and wildlife, including terrestrial invertebrates, mammals, and birds. For aquatic and/or wetland communities, the major groups are flora and fauna, including vertebrates (waterfowl and fish), aquatic invertebrates, and wetland/terrestrial mammals. Species presence and relative abundance were partly determined during the site reconnaissance.

Primary criteria for selecting appropriate assessment receptors include, but are not limited to, the following:

- The assessment receptor has a relatively high likelihood of contacting chemicals via direct or indirect exposure.
- The assessment receptor exhibits marked sensitivity to chemicals.
- The assessment receptor is a key component of ecosystem structure or function (e.g., importance in the food web or ecological relevance).
- The assessment receptor may be listed as rare, threatened, or endangered by a governmental organization, or the receptor consists of critical habitat for rare, threatened, or endangered species.

Additional criteria for selection of assessment receptors were used to identify species that offer the most favorable combination of characteristics for determining the implications of on-site contaminants. These criteria included (1) limited home range, (2) role in local nonhuman food chains, (3) potential high abundance and wide distribution at the site, (4) sufficient toxicological information available in the literature for comparative and interpretive purposes, (5) sensitivity to COPECs, (6) relatively high likelihood of occurrence on site following remediation (if required);

(7) suitability for long-term monitoring, (8) importance to the stability of the ecological food chain or biotic community of concern, and (9) relatively high likelihood that species will be present at the site or that habitats present at the site could support the species. Assessment receptors are representative species that are modeled for exposure to contaminants via multiple exposure routes. Organisms at the base of the food chain (i.e., plants, invertebrates, etc.) are not evaluated for food chain effects because direct exposure is the primary exposure route of concern for these organisms, which is evaluated by the ecological benchmark comparison during the initial COPEC screening process. Therefore, these types of organisms are not selected as assessment receptors.

AP1 is characterized by an ash pit area in a depression with shrub/scrub cover and successional forests adjacent to the depression. A drainage channel is also present to the west of the ash pit and flows from the southwest to the northeast.

2.4.1 Terrestrial Receptors

Seven representative terrestrial receptor species that are expected or possible in the area of AP1 (based on the ecological description of the site presented in Section 2.1) were selected as indicator species for the potential effects of COPECs. These indicator species represent two classes of vertebrate wildlife (mammals and birds) and a range of both body size and food habits, and include herbivores, omnivores, and carnivores. Vegetation is not considered an assessment receptor. The seven terrestrial species selected include the deer mouse (*Peromyscus maniculatus*) (small omnivorous mammal), short-tailed shrew (*Blarina brevicauda*) (small insectivorous mammal), Eastern cottontail rabbit (*Sylvilagus floridanus*) (medium-sized herbivorous mammal), marsh wren (*Cistothorus palustris*) (small insectivorous bird), white-tailed deer (*Odocoileus virginianus*) (large herbivorous mammal), raccoon (*Procyon lotor*) (medium-sized omnivorous mammal), and red-tailed hawk (*Buteo jamaicensis*) (large, carnivorous bird).

A terrestrial food web for the two ash pits is presented on Figure 2-4. Many of the species evaluated have limited home ranges, particularly the deer mouse, cottontail rabbit, short-tailed shrew, and marsh wren, which make them particularly vulnerable to exposure from site contaminants. All of the selected terrestrial receptor species have a potentially high abundance and wide distribution at the site; also, sufficient toxicological information (with the exception of some bird species) is available in the literature for comparative and interpretive purposes. All species are considered important to the stability of the local ecological food chain and biotic community. Finally, all the selected species have readily available exposure data, as summarized in the *Wildlife Exposure Factors Handbook* (EPA, 1993).

Larger mammal species were generally not selected as sensitive receptors due to their large home ranges; however, the red-tailed hawk was retained due to its unique role as a top predator in the food chain, and the white-tailed deer was retained due to its high abundance at the site. Smaller birds were generally not included because most are migratory. The potential risk to species with larger home ranges and migratory avian species are included within the predicted risks to the selected terrestrial indicator receptors. Area use factors (AUF) were set to 100 percent for the mouse, shrew, rabbit, and wren, due to their relatively small home ranges (Section 3.1). However, for the deer, hawk, and raccoon, the AUF was set at 0.002, 0.001, and 0.005 (or 0.2, 0.1, and 0.5 percent), respectively, based on these species' relatively large home ranges (518, 842, and 156 hectares, or 1,280, 2,081, and 385 acres, respectively), compared with the size of the site being evaluated (approximately 2 acres).

Results of the assessment receptor selection process are presented in detailed biological and ecological descriptions called assessment receptor profiles (ARP). The biologically relevant criteria used to select the seven terrestrial assessment receptors are also discussed and summarized in the ARPs (Appendix D).

2.4.2 Aquatic Receptors

The aquatic habitat at AP1 consists of the unnamed ditch that flows from the southwest to the northeast just to the northwest of AP1 (Photograph 3 on Figure 2-1; Figure 2-3). Water approximately 1 to 2 feet deep has been present in this ditch during every site reconnaissance visit, and this ditch likely contains water throughout most of the year. Exposure to aquatic organisms within this area is assumed to occur via direct exposure to contaminants in the water column, ingestion of surface water (via drinking and as a result of bioconcentration through direct contact) and sediment (while foraging, preening, etc.), and ingestion of food items (i.e., plants, benthic invertebrates, and prey) exposed to contaminants in surface water and sediment. Potential uptake through the aquatic food chain is evaluated for the raccoon (also considered as a terrestrial receptor). The muskrat (*Ondatra zibethicus*) (medium-sized aquatic herbivorous mammal) is also evaluated at AP1. The inclusion of the muskrat receptor is conservative, because muskrats require water of sufficient depth or velocity to prevent fully freezing in the winter and the unnamed ditch adjacent to AP1 may not fulfill these requirements. An avian aquatic omnivore such as the mallard (*Anas platyrhynchos*) is not evaluated because pooled water of sufficient depth to attract dabbling ducks is not present at the site.

Aquatic organisms represent some of the prey base for aquatic receptors, represented by the raccoon and muskrat. An aquatic food web is presented on Figure 2-5. The raccoon is a likely visitor to the site (Section 2.1) and has a potentially high abundance and wide distribution in the

area, and sufficient toxicological information is available in the literature for comparative and interpretive purposes. The muskrat is also likely to be found at PBOW (Table 2-2). As mentioned previously, the aquatic habitat may be too limited to support muskrat populations at AP1 but is conservatively included in the evaluation to represent mammalian aquatic herbivores. Both the raccoon and muskrat have readily available exposure data, as summarized in the *Wildlife Exposure Factors Handbook* (EPA, 1993).

Results of the assessment receptor selection process, including a summary of the relevant biological criteria used, are presented in the ARPs (Appendix D).

2.5 Ecological Site Conceptual Model

Pictorial representations of the evaluated food webs are presented on Figures 2-4 and 2-5. The accompanying text presented in Section 3.1 is intended to clarify the ecological site conceptual models (ESCM). The ESCMs trace the contaminant pathways through both abiotic components and biotic food web components of the environment. The ESCMs present all potentially complete exposure pathways. The ESCMs have been used as a tool for judging the appropriateness and usefulness of the selected measurement endpoints in evaluating the assessment endpoints and for identifying sources of uncertainty in the exposure characterization.

3.0 Exposure Characterization

An estimate of the nature, extent, and magnitude of potential exposure of assessment receptors to COPECs that are present at or migrating from the site is presented in this section, considering both current and reasonably plausible future use of the site. Exposure characterization is critical in further evaluating the risk of chemicals identified as COPECs during the screening process (Section 2.2). The exposure assessment has been conducted by linking the magnitude (concentration) and distribution (locations) of the contaminants detected in the media sampled during the investigation, evaluating pathways by which chemicals may be transported through the environment, and determining the points at which organisms found in the study areas may contact contaminants.

3.1 Exposure Analysis

An exposure analysis that combines the spatial and temporal distribution of the ecological receptors with those of the COPECs was performed to evaluate exposure. The exposure analysis focuses on the bioavailable chemicals and the means by which the ecological receptors are exposed (e.g., exposure pathways). The focus of the analysis is dependent on the assessment receptors being evaluated as well as the assessment and measurement endpoints.

Exposure pathways consist of four primary components: source and mechanism of contaminant release, transport medium, potential receptors, and exposure route. A chemical may also be transferred between several intermediate media before reaching the potential receptor. All of these components have been addressed within the SLERA. If any of these components is not complete, then contaminants in the affected media do not constitute an environmental risk at the site. The major fate and transport properties associated with typical site contaminants are described in subsequent sections. These properties directly affect a contaminant's behavior in each of the exposure pathway components.

Ecological routes of exposure for biota may be direct (bioconcentration) or through the food web via the consumption of contaminated organisms (biomagnification). Direct exposure routes include dermal contact, absorption, inhalation, and ingestion. Examples of direct exposure include animals incidentally ingesting contaminated soil or sediment (e.g., during burrowing or dust-bathing activities), animals ingesting surface water, plants absorbing contaminants by uptake from contaminated sediment or soil, and dermal contact of aquatic organisms with contaminated surface water or sediment. Given the scarcity of available data for wildlife dermal and inhalation exposure pathways, potential risk from these pathways is not estimated in this

SLERA. In addition, these pathways are generally considered to be incidental for most species, with the possible exceptions of burrowing animals and dust-bathing birds.

Food web exposure can occur when terrestrial or aquatic fauna consume contaminated biota. Examples of food web exposure include animals at higher trophic levels consuming plants or animals that bioaccumulate contaminants.

Bioavailability is an important contaminant characteristic that influences the degree of chemical-receptor interaction. The bioavailability of a chemical refers to the degree to which a receptor is able to absorb a chemical from the environmental medium. A chemical's bioavailability is a function of several physical and chemical factors such as grain size, organic carbon content, water hardness, and pH.

Daily doses of COPECs for vertebrate receptors were calculated using standard exposure algorithms. These algorithms incorporate species-specific natural history parameters (i.e., feeding rates, water ingestion rates, dietary composition, etc.) and also use site-specific AUFs, as follows:

$$Total\ Daily\ Dose = \left(\frac{\left(\left[Soil_j * IR_{soil} \right] + \left[Water_j * IR_{water} \right] + \left[\sum_{i=1}^{N} B_{ji} * P_i * IR_{food} \right] \right)}{Body\ Weight} \right) * AUF \qquad \text{Eq. 3.1}$$

where:

$Soil_j$	=	Concentration of COPEC "j" in soil
$Water_j$	=	Concentration of COPEC "j" in surface water
B_{ji}	=	Concentration of COPEC "j" in food type "i"
IR_{soil}	=	Soil ingestion rate
IR_{water}	=	Surface water ingestion rate
IR_{food}	=	Food ingestion rate
P_i	=	Proportion of food $type_i$ in receptor diet
AUF	=	Area use factor (equal to area of exposure unit/home range of receptor
Body Weight	=	Body weight of receptor.

Sediment may replace soil in Equation 3.1 for aquatic or semiaquatic receptors.

The first step in estimating exposure rates for terrestrial wildlife involves the calculation of feeding and drinking rates for site receptors. EPA (1993) includes a variety of exposure information for a number of avian, herptile, and mammalian species. Information regarding

feeding and drinking rates and dietary composition are available for many species or may be estimated using allometric equations (Nagy, 1987). Data have also been gathered on incidental ingestion of soil and is incorporated for the receptor species. Literature values for animal-specific sediment ingestion are used if available. However, such values generally are not available in the literature. Where sediment ingestion rates could not be found, the animal-specific incidental soil ingestion rate is used for sediment ingestion as well, if the receptor's life history profile suggests a significant aquatic component (e.g., raccoons' use of surface water in foraging activities). This information is summarized in Table 3-1.

To estimate dose associated with ingested food items, concentrations of COPECs in the vegetation or prey in the species' diet is estimated using BAFs (sometimes referred to as bioconcentration factors). BAFs are regression models or scalar variables that reflect the potential for the COPECs to be present in food items at concentrations different from (usually greater than) the ambient environment. Differences in concentration are due to chemical-specific properties of the COPEC that affect its tendency to bioaccumulate in tissue, balanced by the innate ability of the species to regulate body burden levels of the chemical via metabolic and excretory processes.

Selection of appropriate BAFs is a critical component to food chain modeling. General approaches for BAF selection have been discussed in Sample and Suter (1994), EPA (1999a), U.S. Army Environmental Center (2005) and EPA (2008). An approach that is consistent with these sources was followed in the selection of BAFs for PBOW. The general hierarchy for selection of BAFs based on types of sources, is as follows:

1. Use of regression equations derived from paired field- or laboratory-based measurements

2. Ratio-derived BAFs developed based on paired data of tissue concentrations compared to media concentrations where the BAF is equal to the tissue concentration divided by the concentration in the abiotic medium.

3. Modeled equilibrium partitioning-derived BAFs based on physical or chemical characteristics

4. Assumptions based on values common to chemical class.

Both U.S. Army Environmental Center (2005) and EPA (1999a) support the use of ratio BAFs in preference to equilibrium partitioning-based BAFs, which are typically calculated based on

factors such as log octanol-water partition coefficient (K_{ow}) values, fraction of organic carbon in soil, or percent of lipids in invertebrates.

Other general recommendations provided in EPA (2008) were also followed, including the following:

- For selection of ratio-based BAFs, median values are selected over maximum or other high-end BAFs.
- BAFs for accumulation of polynuclear aromatic hydrocarbons (PAH) into mammalian prey are assumed to equal zero due to the high metabolic breakdown of PAHs in mammals.

Regression equations used to calculate prey tissue concentrations of a specific chemical typically take the following general equation form:

$$\text{Ln}\ (C_{food}) = \text{slope value x ln}\ (C_{abiotic_media}) + \text{intercept value} \qquad \text{Eq. 3.2}$$

where:

C_{food}	=	Concentration of chemical in food type
$C_{abiotic_media}$	=	Concentration of chemical in abiotic media.

Ratio BAFs can be generally presented as follows:

$$C_{food} = \text{BAF x}\ (C_{abiotic_media}) \qquad \text{Eq. 3.3}$$

where:

C_{food}	=	Concentration of chemical in food type
$C_{abiotic_media}$	=	Concentration of chemical in abiotic media
BAF	=	Constant.

BAFs calculated based on equilibrium partitioning typically use a physical constant of a chemical to generate a BAF. A generalized form for this calculation would be as follows:

$$\text{Log (BAF)} = \text{slope value x Log}\ (K_{ow}) + \text{intercept value} \qquad \text{Eq. 3.4}$$

where:

Log (BAF)	=	Log of the BAF for chemical in food type

BAFs calculated based on equilibrium partitioning are applied in the same fashion as ratio-based BAFs to generate a tissue concentration value. Any K_{ow} values needed for BAFs based on equilibrium partitioning are obtained from EPA's Estimation Program Interface Suite K_{ow}Win software program (available on-line).

Finally, where ratio-based BAFs are missing and where no equilibrium partitioning method has been developed for calculating BAFs, other methods, such as using BAFs for chemicals in the same class as surrogates, may be presented for establishing ratio-based BAFs.

For the current SLERA, PBOW-specific BAFs that were developed as part of the Red Water Ponds Phase II baseline ecological risk assessment (BERA) (IT, 2001b) were used for the AP1 food chain models, when available. Site-specific soil-to-earthworm and sediment-to-benthic invertebrate BAFs were developed in this BERA based on 28-day bioaccumulation studies performed using the earthworm species *Eisenia foetida* or the invertebrate species *Lumbriculus variegates,* respectively, and soil or sediment samples collected from the PBOW Red Water Ponds area. Both reasonable maximum exposure (RME) and central tendency (CT) BAFs were estimated in the Red Water Ponds risk assessment. The RME BAFs were based on all tissue concentration results, even if blank related, and the CT BAFs were based on blank-corrected tissue results. Although EPA recommends that median values be selected over maximum or other high-end BAFs, the RME sediment-to-aquatic invertebrate and soil-to-worm BAFs were conservatively selected over the CT BAFs as the selected BAFs for the AP1 and Ash Pit 3 SLERAs, when available. The Red Water Ponds BERA also developed CT and RME BAFs for surface water to fish for two different PBOW sites, the West Area Red Water Ponds and Pentolite Road (IT, 2001b). These values were also adopted for use in the AP1 SLERA. When two values were available for a given chemical from the two areas, the average of the RME values was used as the BAF for the AP1 SLERA.

The hierarchies used to select BAFs specific to the various types of biota are presented below. Chemical-specific BAFs (or the regression equation used to calculate COPEC concentrations) for COPECs selected using the respective hierarchies are presented in Tables 3-2 through 3-6.

Table 3-2 presents the soil-to-plants BAFs for COPECs at AP1. Soil-to-plants BAFs are also used to evaluate sediment-to-plant uptake at PBOW. Soil-to-plants BAFs are selected using the following specific hierarchy of sources:

1. EPA (2008) selected regressions
2. Efroymson, et al. (2001) regressions
3. EPA (2008) recommended median BAFs
4. International Atomic Energy Agency (IAEA) (1994) BAFs
5. Baes, et al. (1984) BAFs (these values were often updated in the more recent IAEA [1994] publication).

Table 3-3 presents the soil-to-invertebrates (earthworms) BAFs for COPECs at AP1. Soil-to-invertebrates BAFs are selected using the following hierarchy of sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (2008) selected regressions
3. Sample, et al. (1998a) regressions
4. Sample, et al. (1998a) median BAFs
5. Equilibrium BAF calculation method in EPA (2008) based on Jager (1998).

Table 3-4 presents the soil-to-mammals BAFs for COPECs at AP1. Soil-to-mammals BAFs are selected using the following hierarchy or sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (2008) or Sample, et al. (1998b) selected regressions
3. EPA (2008) referenced BAFs (Note: per EPA [2008], a BAF of zero is used for all PAHs, TNT, and RDX.)
4. Sample, et al. (1998b) median BAFs
5. IAEA (1994) BAFs
6. Baes, et al. (1984) BAFs (these values were often updated in the newer IAEA [1994] publication)
7. EPA (1999b) maximum calculated BAFs/bioconcentration factors for feeding guilds.

Table 3-5 presents the sediment-to-aquatic invertebrates BAFs for COPECs at AP1. Sediment-to-aquatic invertebrates BAFs are selected using the following hierarchy of sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. Ratio BAFs from Bechtel Jacobs Company, LLC (1998)
3. Ratio BAFs from EPA (1999b)
4. Ratio BAFs from other literature sources
5. Conservative default based on median BAF for polychlorinated biphenyls from Bechtel-Jacobs Corporation, LLC (1998).

Table 3-6 presents the surface water-to-fish BAFs for COPECs at AP1. Surface water-to-fish BAFs are selected using the following hierarchy:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (1999b) ratio BAFs

3. EPA (1989b) ratio BAFs
4. Risk Assessment Information System database (Oak Ridge National Laboratory, 2008, on-line)
5. Equilibrium partitioning equation (Bintein and Devillers, 1993).

It should be noted that the BAFs presented in EPA (1989a; 1999b) are presented in units of milligrams per kilogram (mg/kg) (wet) per milligrams per liter (mg/L). These BAFs were adjusted to BAFs with dry weight units of mg/kg (dry) per mg/L by dividing by the proportion of solids of a fish (20 percent, as detailed in Table C-5 of EPA [2000]).

Ingestion rates for receptor species are typically developed as a quantity of wet weight material ingested. Soil analytical data results are typically reported on a dry weight basis. Literature-derived BAFs are often a mixture of dry weight to wet weight and dry weight to dry weight values. To avoid underestimating or overestimating food concentrations based on confusion over dry weight versus wet weight, final food concentrations are adjusted in the SLERA to report concentrations on a dry weight basis. Although it was not necessary to convert food intake rates from wet weight to dry weight in this SLERA, the moisture contents of the invertebrate and vegetative material in the receptor species' diets from the EPA's *Wildlife Exposure Factors Handbook* (EPA, 1993) can be used for this conversion, as follows:

- Earthworms - 84 percent
- Fruit - 77 percent
- Roots/young grass - 82 percent
- Seeds - 9.3 percent
- Fruit/young grass - 78 percent.

Exposure to four categories of environmental media are addressed in the SLERA, as discussed in the following subsections.

Soil Exposure Pathway. Soil exposure pathways are potentially important for terrestrial plants and animals at the site. For nonburrowing animals, exposure to soil from a depth of 0 to 1 foot bgs is typically considered appropriate, as this soil depth would represent the depth of regular exposure. However, this exposure depth was extended for a few soil samples at AP1 (AP0001 and AP0017; see Table 2-7) that had sampling intervals primarily in the 0 to 1 foot bgs range, but end depths that approached 2 feet bgs. For burrowing animals such as the shrew, exposure to soil from a depth of 0 to 6 feet bgs was considered. It is noted that although the shrew itself may not actually burrow to a depth of 6 feet, there may be other burrowing mammals that do burrow this deep. For plants and herbivores feeding on deep-rooted plants (e.g., the white-tailed deer, which is assumed to ingest leaves of trees translocating COPECs from

subsoils), exposure to soil from a depth of 0 to 6 feet bgs (or the water table surface) was also evaluated because most feeder roots for vegetation that may be ingested by the white-tailed deer are located within this depth. Thus, the shrew and the white-tailed deer (Figure 2-4) were evaluated for exposure to deeper (0 to 6 feet bgs) soil. All other receptors exposed to soil were evaluated for exposure to concentrations in surface (0 to 1 foot bgs, extended to 2 feet bgs for a few samples, as noted previously) soil.

Environmental conditions such as soil moisture, soil pH, and cation exchange capacities significantly influence whether potential soil contaminants remain chemically bound in the soil matrix or can be chemically mobilized (in a bioavailable form) and released for plant absorption. Generally, neutral to alkaline soils (soil pH of 6.5 or greater) restrict the absorption of toxic metals, making pathway completion to plants difficult.

Sediment Exposure Pathway. Sediment consists of materials precipitated or settled out of suspension in surface water or native soils underlying flowing or standing surface water bodies. Potential contaminant sources for sediment include overground transport from the AP1 area, and contaminated surface water, groundwater, and soil. The release mechanisms include surface water runoff, groundwater discharge, and airborne deposition. Potential receptors of chemicals in contaminated sediment include aquatic flora and fauna. Direct exposure routes for contaminated sediment include contact by benthic-dwelling organisms such as amphipod invertebrates, uptake by aquatic flora, and ingestion by aquatic fauna. Indirect exposure pathways from sediment include consumption of bioaccumulated contaminants by consumers in the food chain. Chemical bioavailability of many nonpolar organic compounds (e.g., polychlorinated biphenyls and pesticides) decreases with increasing concentrations of total organic carbon in the sediment; however, these compounds can still bioaccumulate up the food chain (Landrum and Robbins, 1990).

Surface Water Exposure Pathway. Surface water represents a potential transport medium for COPECs. Potential sources for contaminated surface water include overground transport from the AP1 area, contaminated soil/sediment and groundwater, and deposition of airborne contaminants. The release mechanisms include surface runoff, leaching, and groundwater seepage. Potential receptors of contaminated surface water include terrestrial and aquatic fauna and aquatic flora. Exposure routes for contaminated surface water include ingestion by terrestrial fauna and uptake and absorption by aquatic flora and fauna. Consumption of bioaccumulated contaminants constitutes a potential indirect exposure pathway for faunal receptors. Chemical bioavailability of some metals and other chemicals is controlled by water hardness, pH, and total suspended solids.

Groundwater Exposure Pathway. Groundwater represents a potential transport medium for COPECs. Potential contaminant sources for groundwater include contaminated soil and buried or stored waste. The release mechanism for contaminants into groundwater is direct transfer of contaminants from waste materials to water as water passes through the materials.

Groundwater itself is not an exposure point in ecological risk assessments, although contaminant transport along the shallow groundwater pathway may be considered an exposure route to aquatic life, wetlands, and some wildlife where the groundwater discharges to surface water. In such cases, an evaluation of concentrations present in the surface water medium provides a more realistic and accurate risk scenario, because target receptors are hypothetically exposed to the concentrations they actually experience in their immediate environment and habitat. Therefore, groundwater was not directly evaluated in this SLERA. However, because the surface water samples that were obtained as part of the current environmental investigation were collected at AP1 during the wet season in May 2009 (i.e., during the time of year when groundwater discharge to the surface water features is most likely), it is probable that the data reflect any influence of groundwater discharge that may be occurring at the site. Thus, the surface water evaluation considers potential impact from contaminants that may be present in groundwater under exposure conditions in an aquatic habitat.

3.2 Exposure Characterization Summary

The estimated chemical intakes for each exposed receptor group under each exposure pathway and scenario are presented in the risk characterization spreadsheets in Appendix E. These intake estimates are combined with the COPEC toxicity values, discussed in the following section, to derive estimates and characterize potential ecological risk. The chemical data used in the SLERA are presented in Appendix F. The uncertainties associated with the estimation of chemical intake are discussed in Section 5.2.

4.0 Ecological Effects Characterization

TRVs focusing on the growth, survival, and reproduction of species and/or populations have been developed for the AP1 SLERA. Empirical data are available for the specific receptor-endpoint combinations in some instances. Data on surrogate species and/or on endpoints other than the NOAEL and LOAEL were considered as necessary. The NOAEL is a dose of each COPEC that will produce no known adverse effects in the test species. The NOAEL was judged to be an appropriate toxicological endpoint because it would provide the greatest degree of protection to the receptor species. In addition, the LOAEL was used as a point of comparison for risk management decisions. For assessment receptors that represent a threatened or endangered species, no calculation based on a LOAEL is performed, and recommendations are based solely on the more conservative NOAEL. In instances where data are unavailable for a site-associated COPEC, toxicological information for surrogate chemicals or groups of chemical was used. Safety factors were used to adjust for these differences and extrapolate risks to the site's receptors at the NOAEL and/or LOAEL endpoint. This process is described in the following paragraphs.

Toxicity information pertinent to identified receptors has been gathered for those analytes identified as COPECs. Because the measurement endpoint ranges from the NOAEL to the LOAEL, preference has been given to chronic studies noting concentrations at which no adverse effects were observed and those for which the lowest concentrations associated with adverse effects were observed. As previously noted, where data are unavailable for the exposure of a receptor to a COPEC, data for a surrogate chemical or group of chemicals were considered for use in the SLERA.

Whenever possible, studies that use the site-specific target wildlife receptors were utilized. When studies for these species were not available, alternative species studies were used. TRVs are not applied across classes under any circumstances (e.g., a TRV for a bird species may not be used to estimate hazard for a mammal species). In instances where TRVs for multiple avian or mammalian species are supported, the TRV for the most similar species to the measurement receptor based on feeding strategy and physiological attributes were used in the SLERA. For example, for mercury, which was identified as a COPEC in soil at AP1, mammalian TRVs based on both mink and mouse test species data are available. The mink TRV was used in the food chain model to evaluate the raccoon measurement receptor because both the mink and the raccoon are carnivores/omnivores that forage along stream corridors, whereas the mouse TRV

was used for the other mammalian measurement receptors due to closer taxonomic similarity (e.g., short-tailed shrew) and/or foraging patterns (e.g., cottontail rabbit, white-tailed deer). Avian TRVs based on multiple test organisms were also available for two other COPECs, lead and selenium, and were evaluated for specific measurement receptors as follows:

COPEC	TRV Test Species	Measurement Receptor
Lead	Quail	Marsh Wren
Lead	Kestrel	Red-Tailed Hawk
Selenium	Duck	Marsh Wren
Selenium	Owl	Red-Tailed Hawk

Using the relevant toxicity information, TRVs were calculated for each of the COPECs. TRVs represent NOAELs and LOAELs with the safety factors presented in Wentsel, et al. (1996), applied to toxicity information that was derived from studies other than no-effects or lowest-effects studies (Figure 4-1).

Because NOAELs and LOAELs for the selected wildlife receptor species are based on data from test species that are usually different from the species of concern, a mathematical adjustment to the TRVs has often been performed in the past (e.g., Sample, et al., 1996) using a power function of the ratio of body weights. This practice is often referred to as allometric scaling. Alternately, uncertainty factors have also been used to account for the differences in species' sensitivities to chemicals. However, in recent years, these practices have been discouraged by most scientific and regulatory groups. Recent reviews of these practices (e.g., EPA, 2008; Allard, et al., 2009) have concluded that the use of allometric scaling of TRVs does not reflect a sound application of toxicological or ecological risk practices because supporting data for this practice are limited, and the ratio relationships used for the mathematical conversions were developed based on acute (rather than chronic) toxicity data. These reviews further conclude that uncertainty factors to account for interspecies differences based on an arbitrary multiplier should not be used without a scientific basis for their application (Allard, et al., 2009). Therefore, the use of toxicity data without adjustments as reported in the literature is regarded as the most technically sound approach and is adopted for this SLERA. The TRVs used for this SLERA are summarized in Tables 4-1 and 4-2 for mammals and birds, respectively.

Exposure rate TRVs provide a reference point for the comparison of toxicological effects upon exposure to a contaminant and are compared against calculated receptor doses. TRVs are not used for evaluating community-based receptors such as plants or invertebrates.

5.0 Risk Characterization

The risk characterization phase integrates information on exposure, exposure-effects relationships, and defined or presumed target populations. The result is a determination of the likelihood, severity, and characteristics of adverse effects to environmental stressors present at a site. Qualitative and semiquantitative approaches were used to estimate the likelihood of adverse effects occurring as a result of exposure of the selected site receptors to COPECs. Because potential adverse affects to terrestrial and aquatic plants and invertebrates have been qualitatively assessed during the initial COPEC screening step, the risk characterization focuses on potential impacts to assessment receptors (Section 2.3).

For the semiquantitative predictive assessment, TRVs and exposure rates have been calculated and are used to generate hazard quotients (HQ) (Wentsel, et al., 1996). HQs are calculated by summing intake doses across all exposure pathways for each chemical for a given receptor and dividing by the TRV. HQs for those chemicals that have a similar mode of toxicological action are typically summed to account for cumulative effects; however, no groups of COPECs with similar toxicity mechanisms were identified for this SLERA, and HQs for multiple chemicals were not summed. HQs are a means of estimating the potential for adverse effects to organisms at a contaminated site and for assessing the potential that toxicological effects will occur among site receptors.

5.1 Hazard Estimation for Terrestrial and Aquatic Wildlife

The hazard estimation was performed through a series of quantitative HQ calculations that compare receptor-specific exposure values with TRVs. The HQs are compared to HQ guidelines for assessing the risk posed from contaminants. HQs less than or equal to 1 represent no probable risk, HQs from 1 up to but less than 10 represent a low potential for environmental effects, HQs from 10 up to but less than 100 represent a significant potential that effects could result from greater exposure, and HQs greater than 100 represent the highest potential for expected effects (Wentsel, et al., 1996). It should be noted that OEPA considers HQs greater than 1 to be potentially significant. It should also be noted that HQs are not measures of risk, population-based statistics, or linearly scaled statistics. Therefore, an HQ above 1, even exceedingly so, does not definitively indicate that there is even one individual expressing the toxicological effect associated with a given chemical to which it was exposed (Tannenbaum, 2005; Bartell, 1996).

Table 5-1 summarizes the NOAEL and LOAEL-based HQs for the eight evaluated assessment receptors at AP1. No chemicals had an HQ greater than 1 for any receptor. Therefore, the

potential for adverse effects to ecological receptors appears to be very low at AP1. No chemicals at this site are recommended for further ecological evaluation.

5.2 Uncertainty Analysis

A number of factors contribute to the overall variability and uncertainty inherent in ecological risk assessments. Variability is due primarily to measurement error. Laboratory media analyses and receptor study design are the major sources of this kind of error. Uncertainty, on the other hand, is associated primarily with deficiency or irrelevancy of effects, exposure, or habitat data to actual ecological conditions at the site. Species physiology, feeding patterns, and nesting behavior are poorly predictable; therefore, all toxicity information derived from toxicity testing, field studies, or observation have uncertainties associated with them. Laboratory studies conducted to obtain site-specific, measured information often suffer from poor relevance to the actual exposure and uptake conditions on site (i.e., bioavailability, exposure, assimilation, etc., are generally greater under laboratory conditions than field conditions). Calculating an estimated value based on a large number of assumptions is often the only alternative to the accurate, albeit costly, method of direct field or laboratory observation, measurement, or testing. Finally, habitat- or site-specific species may be misidentified if, for example, the observational assessment results are based on only one or even two brief site reconnaissance surveys. However, the three site reconnaissance visits that were performed at AP1 were considered sufficient to adequately assess the habitat present at each site and select appropriate representative receptors for the type of habitat available.

The uncertainty analysis lists:

- Many of the major assumptions made for the SLERA; the direction of bias caused by each assumption, i.e., whether the uncertainty results in an overestimate or underestimate of risk
- The likely magnitude of impact as high, medium, low, or unknown
- Where possible, a description of recommendations for minimizing the identified uncertainties if the SLERA progresses to higher level assessment phases.

The most important uncertainties associated with this SLERA are discussed in the following subsections.

Assumptions of bioavailability. The assumption that COPECs are 100 percent bioavailable is a worst-case assumption and likely overestimates the potential for adverse effects. The duration that has lapsed since the contaminant release affects bioavailability as the contaminant

becomes sequestered or transformed within the environmental media. Sequestration, transformation, and bioavailability are influenced by medium characteristics including pH, temperature, and organic carbon content.

Use of laboratory-derived or empirically estimated partitioning and transfer factors. The use of laboratory-derived or empirically estimated partitioning and transfer factors to predict COPEC concentrations in plants, invertebrates, prey species, and sediment likely overestimates potential risks. As discussed previously, the incorporation of COPECs into the food chain is influenced by the characteristics of the exposure medium, which likely differs from that used in the laboratory to derive partitioning and transfer factors.

Use of laboratory-derived toxicity reference values. The use of laboratory-derived TRVs may overestimate or underestimate the potential for adverse effects. The method of administration of the contaminant in the laboratory is significantly different than that experienced in the wild by the receptors.

TRVs were not available for beryllium for birds. Beryllium was selected as a COPEC in sediment at AP1 because it lacks an ESV. However, the MDC for beryllium of 1.6 mg/kg only marginally exceeds the soil BSC of 1 mg/kg and is well below the soil ESV of 21 mg/kg, which indicates that highly elevated concentrations of this metal are not present. There is also no known source for beryllium at this site, and beryllium was not identified as a COPEC in soil or surface water at AP1. For these reasons, although the inability to quantify risk to avian assessment receptors associated with beryllium represents an uncertainty in the SLERA, this uncertainty is considered to be minor.

Use of the HQ method to estimate risks to populations or communities. The calculation of HQs also introduces uncertainty. The following limitations associated with HQs (Tannenbaum, et al., 2003) are noted:

- HQs are not measures of risk.
- HQs are not population based.
- HQs are not linearly scaled.
- HQs are often produced that are unrealistically high and toxicologically impossible (e.g., estimated HQs greater than 1,000, although HQs generated for the AP1 and Ash Pit 3 SLERAs do not fall into this category).

- Trace soil concentrations of inorganic chemicals (including concentrations well below background levels) can lead to HQ threshold exceedances.

Sampling and Analytical Limitations. It is not possible to completely characterize the nature and extent of contamination on any site. Uncertainties arise from limits on the number of locations that can be sampled. The sampling protocol used at AP1, however, was designed to optimize efficiency of the sampling effort and reduce uncertainty by providing coverage of the affected area using historical data and site knowledge to focus on the ash layer, which is most likely to be representative of historical PBOW-related contamination. This approach biases potential soil contaminant concentrations higher than if sampling were performed for all soils equally within the entire ash pit and provides a more conservative estimate of potential risk. The sampling and analytical data are considered sufficient to conclude that the potential for adverse impacts associated with chemicals present at the site is very low.

Selection and Quantification of Chemicals of Potential Ecological Concern. Uncertainty associated with the processes used to identify COPECs and estimate EPCs arises from the following:

- Identifying background chemicals. Metals are judged to be present at concentrations comparable to background if the MDC does not exceed the BSC, or if statistical testing demonstrates that the site data and background data are drawn from the same population. Statistical testing of site data versus background was performed for this SLERA. Some organic chemicals, such as PAHs, may be considered to be anthropogenic background. The inclusion of ambient anthropogenic compounds in this SLERA may impart a conservative bias towards the risk assessment. Soil background values were compared with concentrations of metals detected in AP1 sediment in this SLERA. The use of soil background values for comparison to concentrations detected in sediment results in some added uncertainty to the SLERA. Naturally occurring levels of metals can differ in soil and sediment because the presence of metals in the sediment matrix can be affected by factors such as pH of the sediment and overlying water, oxidation/reduction conditions, sediment texture, presence/absence of organic matter, dissolved oxygen levels, etc. Although the concentrations of naturally occurring metals in soil and sediment may differ somewhat, soil background values can provide a reasonable point of reference for determining concentrations in sediment that may be associated with contamination and that warrant further consideration. Because concentrations in “true” background sediment may be higher or lower than their equivalent BSCs in soil, the direction of bias is unknown.

- Estimated EPCs are uncertain. For statistical purposes, if a constituent is positively identified at a site and has at least a single detection, all the samples with nondetects are assumed to have a value equal to half the reporting limit and are included in the data set, although identified for the ProUCL software (EPA, 2010) as nondetects. However, typical laboratory methods are able to detect concentrations of a chemical well below the

reporting limit, or even half the reporting limit. Therefore, although the exact concentration of a nondetect chemical is unknown, the use of half the reporting limit as a surrogate concentration likely overestimates the actual concentration and introduces a conservative bias into the risk assessment. Computed 95 percent UCL values are only estimates of the actual UCLs associated with each data set. Examples of factors affecting the uncertainty of these estimates include the number of samples, proportion of nondetects, conformance with an assumed mathematical distribution, imprecision of laboratory data, elevated detection limits (from dilutions, matrix interference, etc.), and statistical methodology. For some data sets, the MDC was used as the EPC. Uncertainties associated with the statistical determination of EPCs for the COPECs in each medium are as follows:

- A limited number of samples may not completely characterize the site because they provide less information about the population from which they are drawn than do larger sample sets. Accordingly, small sets tend to have a greater variability, which results in the calculation of wide confidence intervals on the mean concentration and high EPCs. In some cases, the 95 percent UCL may be greater than the MDC, which results in the selection of the MDC as the EPC. This did not occur at AP1, however. High confidence limits may introduce a conservative bias into the risk assessment.

- Biased soil sampling is a common practice at contaminated sites for the purposes of identifying nature and extent of contamination and to reduce the potential for Type I errors when performing environmental investigations (i.e., concluding that a site is clean when it really is not). The biased sampling approach likely overestimates chemical concentrations, resulting in greater chemical concentrations and predicted risk. The AP1 sampling strategy was not strongly biased, however, and this uncertainty is considered minor for this SLERA.

- Laboratory analytical techniques have a degree of uncertainty associated with them. These uncertainties are documented by using data qualifiers to reflect the degree of certainty of measurement. For example, some data were estimated (e.g., J-qualified), while other data were rejected (i.e., R-qualified). The direction of bias is unclear.

The use of the 95 percent UCL as the EPC is likely to underestimate the EPC in 5 percent of the cases and overestimate exposure in 95 percent of cases, imparting an overall conservative bias to the risk assessment. It should be noted that some COPEC MDCs measured in sediment and surface water were used as EPCs due to the limited number of samples; if COPECs considered to represent a plausible risk to aquatic populations were identified in these media, an additional sampling effort could potentially reduce the hazard estimate. However, this was not the case at AP1, and no additional sampling is recommended.

6.0 Risk Summary and Conclusions and Recommendations

Chemicals detected in soil, surface water, and sediment were screened against conservative benchmark values and other criteria to identify COPECs in media present at AP1. Six chemicals in soil, nine chemicals in surface water, and seven chemicals in sediment were identified as COPECs for further evaluation. A food chain model was performed at each site to evaluate the potential hazard associated with exposure to these chemicals by representative measurement receptors. The home range size and density characteristics of various ecological species of concern make it unlikely that multiple individuals of a given species (i.e., local populations) would be exposed to the small areas of contaminated soil within the 2-acre AP1 site on a regular basis. In other words, the small size of the site precludes the possibility of population-level impacts at AP1, regardless of whether contamination is present. Nevertheless, hazard estimates were generated for a number of measurement receptors under the conservative assumption that impacts to populations is plausible.

No assessment receptor exceeded an HQ of 1 for any chemical detected at AP1. Therefore, the potential for adverse ecological impacts is considered to be very low at this site, and no chemicals are identified for further evaluation for protection of the environment at AP1.

It is noted that the human health risk assessment recommends no further investigation or other actions at AP1 based on human health concerns. Therefore, no further investigation or other actions are recommended at this site based on either human health or ecological receptors.

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TABLES

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Vegetation observed during early summer (June 2, 2009) site walk	
Acer negundo	Box elder
Achillea millefolium	Yarrow
Agrimonia parviflora	Small-flowered groovebur
Agropyron repens	Quack grass
Agrostis alba	redtop
Alliaria petiolata	Garlic mustard
Ambrosia artemesiifolia	Annual ragweed
Andropogon virginicus	Broom sedge
Anemone virginiana	Thimbleweed
Apios americana	Groundnut
Apocynum cannabinum	Dogbane
Asclepias syriaca	Common milkweed
Bidens frondosa	Devils beggar ticks
Boehmeria cylindrica	Small-spike false nettle
Bromus inermis	Smooth brome
Capsella bursa-pastoris	Shepherd's purse
Carduus nutans	Nodding musk thistle
Carex aggregata	Glomerate sedge
Carex albursina	White bear sedge
Carex amphibola var. turgida	Eastern narrowleaf sedge
Carex blanda	Eastern woodland sedge
Carex frankii	Frank's sedge
Carex granularis	Limestone meadow sedge
Carex scoparia	Broom sedge
Carex sparganoides	Bur-reed sedge
Chenopodium album	Lamb's quarters
Circaea lutetiana	Southern broad-leaved enchanters nightshade
Cirsium arvense	Creeping thistle
Cirsium vulgare	Bull thistle
Clematis virginiana	Virgin's bower
Cornus racemosa	Gray dogwood
Coronilla varia	Crownvetch
Dactylis glomerata	Orchard grass
Daucus carota	Queen Anne's lace
Dichanthelium clandestinum	Deer tongue grass
Dipsacus sylvestris	Teasel
Eleagnus umbellata	Autumn olive
Eleocharis sp.	Spike rush
Epilobium coloratum	Purple-leaved willow herb
Equisetum arvense	Field horsetail
Equisetum hyemale	Scouring rush
Erigeron philadelphicus	Fleabane
Eupatorium rugosum	White snakeroot
Euphorbia maculata	Spotted spurge

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Euthamia graminifolia	Fragrant flat-topped goldenrod
Festuca sp.	Fescue
Fraxinus pennsylvanica	Green ash
Galium aparine	Cleavers
Galium asprellum	Rough bedstraw
Geum laciniatum	Rough avens
Hackelia virginiana	Virginia stickseed
Juncus torreyi	Torrey's rush
Leersia oryzoides	Rice cutgrass
Leersia virginica	White grass
Lemna minor	Lesser duckweed
Lonicera tatarica	Tartarian honeysuckle
Lycopus americana	American bugleweed
Lycopus virginicus	Virginia bugleweed
Lythrum salicaria	Purple loosestrife
Medicago lupulina	Black medick
Melilotus sp.	Sweet clover
Monarda sp.	Bee balm
Morus alba	Mulberry
Nepeta cataria	Catnip
Onoclea sensibilis	Sensitive fern
Panicum dichotomiflorum	Deer tongue grass
Panicum virgatum	Switch grass
Parthenocissus quinquefolia	Virginia creeper
Penstemon digitalis	False foxglove
Phalaris arundinacea	Reed canary grass
Phytolacca americana	Pokeweed
Plantago lanceolata	English plantain
Plantago major	Common plantain
Poa compressa	Canada bluegrass
Poa pratensis	Kentucky bluegrass
Podophyllum peltatum	Mayapple
Polygonum pennsylvanicum	Pennsylvania smartweed
Polygonum virginianum	Virginia knotweed
Prunella vulgaris	Self heal
Pycnanthemum tenuifolium	Slender-leaved mountain mint
Quercus palustris	Pin oak
Ranunculus sceleratus	Cursed crowfoot
Rosa setigera	Prairie rose
Rubus allegheniensis	Allegheny blackberry
Rubus flagellaris	Dewberry
Rubus occidentalis	Black raspberry
Rumex acetosella	Sheep sorrel
Rumex crispus	Curly dock
Salix discolor	Pussy willow

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Salix sp.	Willow
Sambucus canadensis	Common elder
Scirpus atrovirens	Green bulrush
Scirpus cyperinus	Wool grass
Scirpus polyphyllus	Leafy bulrush
Solanum carolinense	Horse nettle
Solidago canadensis	Canada goldenrod
Taraxacum officinale	Dandelion
Teucrium canadense	Germander
Toxicodendron radicans	Poison ivy
Tradescantia ohioensis	Ohio spiderwort
Trifolium pratense	Red clover
Typha angustifolia	Narrow-leaf cattail
Typha latifolia	Broad-leaf cattail
Urtica dioicia	Stinging nettle
Verbena hastata	Blue vervain
Verbena urticifolia	White vervain
Vitis riparia	Riverbank grape

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Vegetation observed during fall (October 16, 2008) site walk	
Acer negundo	Box elder
Achillea millefolium	Yarrow
Agrimonia parviflora	Small-flowered groovebur
Agropyron repens	Quack grass
Agrostis alba	redtop
Alliaria petiolata	Garlic mustard
Ambrosia artemesiifolia	Annual ragweed
Andropogon virginicus	Broom sedge
Apios americana	Groundnut
Apocynum cannabinum	Dogbane
Asclepias syriaca	Common milkweed
Aster lateriflorus	Calico aster
Aster novae-angliae	New England aster
Bidens frondosa	Devils beggar ticks
Boehmeria cylindrica	Small-spike false nettle
Bromus inermis	Smooth brome
Carduus nutans	Nodding musk thistle
Chenopodium album	Lamb's quarters
Circaea lutetiana	Southern broad-leaved enchanters nightshade
Cirsium arvense	Creeping thistle
Cirsium vulgare	Bull thistle
Clematis virginiana	Virgin's bower
Cornus racemosa	Gray dogwood
Coronilla varia	Crownvetch
Dactylis glomerata	Orchard grass
Daucus carota	Queen Anne's lace
Dichanthelium clandestinum	Deer tongue grass
Dipsacus sylvestris	Teasel
Eleagnus angustifolia	Autumn olive
Eleocharis sp.	Spike rush
Epilobium coloratum	Purple-leaved willow herb
Equisetum arvense	Field horsetail
Equisetum hyemale	Scouring rush
Eupatorium rugosum	White snakeroot
Eupatorium sessilifolium	Upland boneset
Euphorbia maculata	Spotted spurge
Euthamia graminifolia	Fragrant flat-topped goldenrod
Festuca sp.	Fescue
Fraxinus pennsylvanica	Green ash
Galium aparine	Cleavers
Geum laciniatum	Rough avens
Gnathalium obtusifolium	Catfoot
Hackelia virginiana	Virginia stickseed
Juncus torreyi	Torrey's rush

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Leersia oryzoides	Rice cutgrass
Leersia virginica	White grass
Lemna minor	Lesser duckweed
Lonicera tatarica	Tartarian honeysuckle
Lycopus americana	American bugleweed
Lycopus virginicus	Virginia bugleweed
Lythrum salicaria	Purple loosestrife
Medicago lupulina	Black medick
Melilotus sp.	Sweet clover
Monarda sp.	Bee balm
Morus alba	Mulberry
Nepeta cataria	Catnip
Onoclea sensibilis	Sensitive fern
Panicum dichotomiflorum	Deer tongue grass
Panicum virgatum	Switch grass
Parthenocissus quinquefolia	Virginia creeper
Phalaris arundinacea	Reed canary grass
Phytolacca americana	Pokeweed
Plantago lanceolata	English plantain
Plantago major	Common plantain
Podophyllum peltatum	Mayapple
Polygonum pennsylvanicum	Pennsylvania smartweed
Polygonum virginianum	Virginia knotweed
Prunella vulgaris	Self heal
Pycnanthemum tenuifolium	Slender-leaved mountain mint
Quercus palustris	Pin oak
Rosa setigera	Prairie rose
Rubus allegheniensis	Allegheny blackberry
Rubus flagellaris	Dewberry
Rubus occidentalis	Black raspberry
Rumex acetosella	Sheep sorrel
Rumex crispus	Curly dock
Salix discolor	Pussy willow
Salix sp.	Willow
Sambucus canadensis	Common elder
Scirpus atrovirens	Green bulrush
Scirpus cyperinus	Wool grass
Scirpus polyphyllus	Leafy bulrush
Setaria glauca	Yellow bristle grass
Solanum carolinense	Horse nettle
Solidago canadensis	Canada goldenrod
Taraxacum officinale	Dandelion
Teucrium canadense	Germander
Toxicodendron radicans	Poison ivy
Tradescantia ohioensis	Ohio spiderwort

Table 2-1

Plant Species Observed at Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Trifolium pratense	Red clover
Typha angustifolia	Narrow-leaf cattail
Typha latifolia	Broad-leaf cattail
Urtica dioicia	Stinging nettle
Verbena hastata	Blue vervain
Verbena urticifolia	White vervain
Vitis riparia	Riverbank grape
Xanthium strumarium	Cockle bur

Table 2-2

Mammals Observed On Site and Likely to Be Found in Erie County, Ohio Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site [a]
Didelphidae	*Didelphis virginiana*	Virginia opossum	
Talpidae	*Condylura cristata*	star-nosed mole (**T**)	
	Parascalops breweri	hairy-tailed mole	
	Scalopus aquaticus	Eastern mole	
Verspertilionidae	*Myotis keenii*	Keen's bat	
	M. lucifugus	little brown bat	
	M. sodalis	Indiana bat **(E*)**	
	Eptesicus fuscus	big brown bat	
	Lasionycteris noctivagans	silver-haired bat	
	Lasiurus borealis	red bat	
	L. cinereus	hoary bat	
	Nycticeius humeralis	evening bat	
	Pipistrellus subflavus	Eastern pipistrelle	
Leporidae	*Sylvilagus floridanus*	cottontail rabbit	
Sciuridae	*Glaucomys volans*	Southern flying squirrel	
	Marmota monax	woodchuck	
	Sciurus carolinensis	gray squirrel	
	S. niger	fox squirrel	
	Spermophilus tridecemlineatus	thirteen-lined ground squirrel	
	Tamias striatus	Eastern chipmunk	
	Tamiasciurus hudsonicus	red squirrel	
	Blarina brevicauda	short-tailed shrew	

Table 2-2

Mammals Observed On Site and Likely to Be Found in Erie County, Ohio Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site [a]
	Cryptotis parva	least shrew	
	Sorex cinereus	masked shrew	
Castoridae	*Castor canadensis*	beaver	
Cricetidae	*Microtus pennsylvanicus*	meadow vole	
	Mus musculus	house mouse	
	Ondatra zibethicus	muskrat	
	Peromyscus leucopus	white-footed mouse	
	P. maniculatus	deer mouse	
	Rattus norvegicus	Norway rat	
	Synaptomys cooperi	Southern bog lemming	
	Zapus hudsonius	meadow jumping mouse	
Procyonidae	*Procyon lotor*	raccoon	
Mustelidae	*Mephitis mephitis*	striped skunk	
	Mustela frenata	long-tailed weasel	
	M. nivalis	least weasel	
	M. vison	mink	
	Taxidea taxus	Badger (**T**)	
Canidae	*Canis latrans*	coyote	
	Urocyon cinereoargenteus	gray fox	
	Vulpes vulpes	red fox	
Cervidae	*Odocoileus virginianus*	white-tailed deer	X

Mammals likely to be found in Erie County based on information presented in:
Gottschang, J. L., 1981, *A Guide to the Mammals of Ohio* , Ohio State University Press, 176 pages.
T - Ohio threatened species.; E* - Federally endangered species.
[a] Shaw Site Reconnaissance April 27 and June 2, 2009.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Ardeidae	*Ardea herodias*	great blue heron	(1) Regular visitor at ponds, streams, and ditches.
	Bublucus ibis	cattle egret (**E**)	(1) Rare visitor in short grass areas
	Butorides striatus	green heron	(1) Confirmed breeder, rare at ponds, streams.
	Casmerodius albus	great egret	(1) Regular visitor at ponds, streams, and ditches.
	Nycticorax nycticorax	black-crowned night heron (**T**)	(1) Regular visitor at ponds, streams, and ditches.
Anserinae	*Branta canadensis*	Canada goose	(1) Confirmed breeder; uncommon around ponds.
Anatinae	*Aix sponsa*	Wood duck	(1) Confirmed breeder, uncommon around ponds.
	Anas discors	blue-winged teal	Confirmed and/or probable breeder in county.
	A. platyrhynchos	mallard	(1) Confirmed breeder, uncommon at ponds, streams.
	A. rubripes	American black duck	(1) Possible breeder, rare at ponds, streams, ditches.
Merginae	*Lophodytes cucullatus*	hooded merganser	Confirmed and/or probable breeder in county.
Accipitrinae	*Accipiter striatus*	sharp-shinned hawk	Confirmed and/or probable breeder in county.
Buteoninae	*Buteo jamaicensis*	red-tailed hawk	Confirmed and/or probable breeder in county.
	B. lineatus	red-shouldered hawk	Confirmed and/or probable breeder in county.
	B. platypterus	broad-winged hawk	Confirmed and/or probable breeder in county.
	Haliaeetus leucocephalus	bald eagle (**T**)	Confirmed and/or probable breeder in county.
Anatidae	*Cygnus buccinator*	Trumpeter swan (**E**)	(1) Rare migrant seen flying toward lake.
Falconinae	*Falco sparverius*	American kestrel	Confirmed and/or probable breeder in county.
Phasianidae	*Colinus virginianus*	Northern bobwhite quail	Confirmed and/or probable breeder in county.
	Phasianus colchicus	ring-necked pheasant	Confirmed and/or probable breeder in county.
Rallidae	*Gallinula chloropus*	common moorhen	Confirmed and/or probable breeder in county.
	Porzana carolina	Sora	Confirmed and/or probable breeder in county.
Cathartidae	*Cathartes aura*	turkey vulture	Possible breeder in county.
Charadriidae	*Charadrius vociferus*	killdeer	(2*) Confirmed and/or probable breeder in county.
Scolopacidae	*Actitis macularia*	spotted sandpiper	Confirmed and/or probable breeder in county.
	Bartramia longicauda	upland sandpiper (**T**)	(1) Confirmed breeder, rare in grassy areas.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
	Gallinago gallinago	common snipe	Confirmed and/or probable breeder in county.
	Scolopax minor	American woodcock	(1) Confirmed breeder, uncommon in moist woodlots.
	Tringa solitaria	solitary sandpiper	(2) Occasional visitor to mud flats.
Larinae	*Larus argentatus*	herring gull	(1) Regular visitor.
	L. delawarensis	ring-billed gull	(1) Regular visitor.
Columbidae	*Columba livia*	rock dove	(1) Confirmed breeder, very common.
	Zenaida macroura	mourning dove	(1) Confirmed breeder, very common.
Cuculidae	*Coccyzus americanus*	yellow-billed cuckoo	(1) Confirmed breeder, uncommon in woodlots, shrubs.
	C. erythropthalmus	black-billed cuckoo	(1) Probable breeder, rare in woodlots & shruby areas.
Tytonidae	*Bubo virginianus*	great horned owl	(1) Confirmed breeder, uncommon in woodlots.
	Otus asio	Eastern screech-owl	(1) Confirmed breeder, common in woodlots, shrubs.
	Strix varia	barred owl	Confirmed and/or probable breeder in county.
Caprimulgidae	*Chordeiles minor*	common nighthawk	(1) Possible breeder, rare.
Apodidae	*Chaetura pelagica*	chimney swift	(1) Confirmed breeder, uncommon.
Trochilidae	*Archilochus colubris*	ruby-throated hummingbird	(1) Confirmed breeder, uncommon in woodlots, shrubs.
Alcedinidae	*Ceryle alcyon*	belted kingfisher	(1) Confirmed breeder, rare around ponds, streams.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Picidae	*Colaptes auratus*	Northern flicker	(1) Confirmed breeder, common in woodlots.
	Dryocopus pileatus	pileated woodpecker	Confirmed and/or probable breeder in county.
	Melanerpes carolinus	red-bellied woodpecker	(1) Confirmed breeder, common in mature woods.
	M. erythrocephalus	red-headed woodpecker	(1) Confirmed breeder, uncommon in mature woods.
	Picoides pubescens	downy woodpecker	(1) Confirmed breeder, common in woodlots.
	P. villosus	hairy woodpecker	(1) Confirmed breeder, uncommon in large woodlots.
Tyrannidae	*Contopus virens*	Eastern wood-pewee	(1) Confirmed breeder, very common in large woodlots.
	Empidonax alnorum	alder flycatcher	(1) Possible breeder, rare in shrubby wet areas.
	E. minimus	least flycatcher (**T**)	(1) Probable breeder, rare in shrubby areas.
	E. traillii	willow flycatcher	(1) (2*) Confirmed breeder, very common in shrubby areas.
	E. virescens	Acadian flycatcher	(1) Confirmed breeder, uncommon in mature woodlots.
	Myiarchus crinitus	great crested flycatcher	(1) Confirmed breeder, common in large woodlots.
	Sayornis phoebe	Eastern phoebe	(1) Confirmed breeder, common near stream bridges.
	Tyrannus tyrannus	Eastern kingbird	(1) Confirmed breeder, very common - open shrub area.
Alaudidae	*Eremophila alpestris*	horned lark	(1) Probable breeder, rare in grassland, cultiv. fields.
Hirundinidae	*Hirundo pyrrhonota*	cliff swallow	Confirmed and/or probable breeder in county.
	H. rustica	barn swallow	(1) Confirmed breeder, very common near vacant bldgs.
	Progne subis	purple martin	(1) Probable breeder, rare.
	Riparia riparia	bank swallow	(1) Rare migrant or visitor.
	Stelgidopteryx seripennis	Northern rough-winged swallow	(1) Confirmed breeder, rare along streams, ditches.
	Tachycineta bicolor	tree swallow	(1) Confirmed breeder, rare around ponds.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Corvidae	*Corvus brachyrhynchos*	American crow	(1) Confirmed breeder, very common in woodlots.
	Cyanocitta cristata	blue jay	(1) Confirmed breeder, abundant in woods.
Paridae	*Parus atricapillus*	black-capped chickadee	(1) Confirmed breeder, common in woodlots.
	P. bicolor	tufted titmouse	(1) Confirmed breeder, common in woodlots.
Sittidae	*Sitta carolinensis*	white-breasted nuthatch	(1) Confirmed breeder, uncommon in woodlots.
Troglodytidae	*Cistothorus palustris*	marsh wren	(1) Possible breeder, rare in wetlands with cattails.
	C. platensis	sedge wren	(1) Confirmed breeder, common in old grassy fields.
	Thryothorus ludovicianus	Carolina wren	(1) Probable breeder, rare in shrubby areas & woodlots.
	Troglodytes aedon	house wren	(1) Confirmed breeder, abundant in shrubby areas.
	T. troglodytes	winter wren	(1) Rare migrant.
Mimidae	*Dumetella carolinensis*	gray catbird	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	Mimus polyglottos	northern mockingbird	(1) Confirmed breeder, rare in shrubby areas.
	Toxostoma rufum	brown thrasher	(1) Confirmed breeder, common in shrubby areas.
Turdidae	*Catharus fuscescens*	veery	(1) Confirmed breeder, uncommon in large woodlots.
	Hylocichla mustelina	wood thrush	(1) Confirmed breeder, very common in large woodlots.
	Sialia sialis	Eastern bluebird	(1) Confirmed breeder, common in openfields & edges.
	Turdus migratorius	American robin	(1) Confirmed breeder, abundant everywhere.
Sylviidae	*Polioptila caerulea*	blue-gray gnatcatcher	(1) Confirmed breeder, uncommon in woodlots.
	Regulus calendula	ruby-crowned kinglet	(1) Rare migrant.
Bombycillidae	*Bombycilla cedrorum*	cedar waxwing	(1) Confirmed breeder, very common everywhere.
Sturnidae	*Sturnus vulgaris*	European starling	(1) (2*) Confirmed breeder, abundant everywhere.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Vireonidae	*Vireo bellii*	Bell's vireo	Confirmed and/or probable breeder in county.
	V. flavifrons	yellow-throated vireo	(1) Confirmed breeder, uncommon in mature woodlots.
	V. gilvus	warbling vireo	(1) Confirmed breeder, common in large woodlots.
	V. griseus	white-eyed vireo	(1) Confirmed breeder, uncommon in shrubby areas.
	V. olivaceus	red-eyed vireo	(1) Confirmed breeder, very common in woodlots.
Parulidae	*Dendroica cerulea*	cerulean warbler	(1) Possible breeder, rare in mature woodlots.
	D. dominica	yellow-throated warbler	(1) Confirmed and/or probable breeder in county.
	D. pensylvanica	chestnut-sided warbler	(1) Probable breeder, uncommon in shrubby areas.
	D. petechia	yellow warbler	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	D. virens	*black-throated green warbler*	(1) Possible breeder, rare in mature woodlots.
	Geothylpis trichas	common yellowthroat	(1) Confirmed breeder, abundant in shrub areas, fields.
	Icteria virens	yellow-breasted chat	(1) Confirmed breeder, uncommon in shrubby areas.
	Mniotilta varia	black and white warbler	(1) Possible breeder, rare in mature woodlots.
	Oporornis formosus	Kentucky warbler	(1) Possible breeder, rare in mature woodlots.
	Protonotaria citrea	prothonotary warbler	Confirmed and/or probable breeder in county.
	Seiurus aurocapillus	overbird	(1) Probable breeder, rare in mature woodlots.
	S. motacilla	Louisiana waterthrush	Confirmed and/or probable breeder in county.
	Setophaga ruticilla	American redstart	(1) Probable breeder, rare in shrubby areas & woodlots.
	Vermivora leucobronchialis	Brewster's warbler	(1) Possible breeder, rare in shrubby areas and edges.
	V. pinus	blue-winged warbler	(1) Confirmed breeder, common in shrubby areas.
	Wilsonia citrina	hooded warbler	Confirmed and/or probable breeder in county.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Icteridae	*Agelaius phoeniceus*	red-winged blackbird	(1) (2*) Confirmed breeder, abund. in grasslands, streams.
	Dolichonyx oryzivorus	bobolink	(1) Confirmed breeder, uncommon in grasslands.
	Icterus galbula	Northern oriole	(1) Confirmed breeder, uncommon in open woods.
	I. spurius	orchard oriole	(1) Confirmed breeder, common in open woods & edges.
	Molothrus ater	brown-headed cowbird	(1) (2) Confirmed breeder, abundant everywhere.
	Quiscalus quiscula	common grackle	(1) Confirmed breeder, abundant everywhere.
	Sturnella magna	Eastern meadowlark	(1) Confirmed breeder, common in grasslands.
Ploceidae	*Passer domesticus*	house sparrow	(1) Confirmed breeder, uncommon near buildings.
Thraupidae	*Piranga olivacea*	scarlet tanager	(1) Possible breeder, rare on open woods.
	P. ruba ruba	summer tanager	(1) Confirmed breeder, common in mature woodlots.
Fringillidae	*Ammodramus henslowii*	Henslow's sparrow	(1) Probable breeder, rare in old fields.
	A. savannarum	grasshopper sparrow	(1) Confirmed breeder, common in grasslands.
	Cardinalis cardinalis	Northern cardinal	(1) (2*) Confirmed breeder, abundant everywhere.
	Carduelis tristis	American goldfinch	(1) Confirmed breeder, abundant in shrubby areas.
	Carpodacus mexicanus	house finch	(1) Confirmed breeder, uncommon around buildings.
	Melospiza georgiana	swamp sparrow	(1) Confirmed breeder, rare in wet fields and ditches.
	M. melodia	song sparrow	(1) (2*) Confirmed breeder, abundant everywhere.
	Passerculus sandwichensis	Savannah sparrow	(1) Confirmed breeder, common in grasslands.
	Passerina cyanea	indigo bunting	(1) (2*) Confirmed breeder, abundant everywhere.
	Pheucticus ludovicianus	rose-breasted grosbeak	(1) Confirmed breeder, common in woodlots & edges.
	Pipilo erythrophthalmus	Eastern towhee	(1) Confirmed breeder, very common in woodlots, edges.

Table 2-3

Birds Observed On Site and/or Likely to Be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
	Pooecetes gramineus	vesper sparrow	(1) Confirmed breeder, uncommon in grassland & fields.
	Spiza amercana	dickcissel	Confirmed and/or probable breeder in county.
	Spizella passerina	chipping sparrow	(1) Confirmed breeder, common in open woods & lawns.
	S. pusilla	field sparrow	(1) Confirmed breeder, abundant in grasslands, shrubs.
	Zonotrichia albicollis	white-throated sparrow	(1) Late migrant, rare.

[a] Family names from Peterson, R.T., 1947, *A Field Guide to the Birds* , Sponsored by the National Audubon Society, Houghton Mifflin Company, Boston, Massachusetts.

[b] Peterjohn, B.G. and D.L. Rice, 1991, *The Ohio Breeding Bird Atlas* , The Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Columbus, Ohio, 416 pages.

[c] E - Ohio Endangered species; T - Ohio Threatened species.

Observation References:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1994).

(2) Observed during Shaw Site Reconnaissance at Ash Pit 1 on April 27, or June 2, 2009.

An asterisk (*) indicates the species was detected during the June site visit, and is likely using the site for breeding.

Table 2-4

Reptiles Observed On Site and Likely to Be Found at Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site
Chelydridae	*Chelydra serpentina*	snapping turtle	(1)
Kinosternidae	*Sternotherus odoratus*	musk turtle	
Emydidae	*Chrysemys picta*	painted turtle	(1)
	Emys blandingii	Blanding's turtle	(1)
	Terrapene carolina	box turtle	(1)
Colubridae	*Elaphe vulpina*	fox snake	(1)
	Heterodon platyrhinos	hog-nosed snake	
	Nerodia septemvittata	queen snake	
	N. sipedon sipedon	water snake	(1)
	Opheodrys vernalis	green snake	(1)
	Storeria dekayi	Dekay's brown snake	(1)
	Thamnophis butleri	Butler's garter snake	(1)
	T. sauritus	ribbon snake	
	T. sirtalis	common garter snake	(1)

References:

Conant, R. and J.T. Collins, 1991, *Reptiles and Amphibians, Eastern/Central North America* , Peterson Field Guide, Third Edition, Houghton Mifflin Company, Boston.

Pfingsten, R.A. and F.L. Downs (eds.), 1989, *Salamanders of Ohio* , Ohio Biological Survey Bulletin, New Series, Vol. 7, No. 2, 315 pages, 29 pls.

Wright, A.H. and A.A. Wright, 1957, *Handbook of Snakes of the United States and Canada* , Volumes I and II, Comstock Publishing Associates, Ithaca and London, 1105 pages.

Reference for on-site observation:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1995).

Table 2-5

Amphibians Observed On Site and Likely to Be Found at Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site
Ambystomatidae	*Ambystoma texanum*	smallmouth salamander	(1)
	Plethodon cinereus	redback salamander	(1)
Bufonidae	*Bufo americanus*	American toad	(1)
Hylidae	*Acris gryllus*	cricket frog	(1)
	Hyla versicolor	gray treefrog	(1)
	Pseudacris crucifer	spring peeper	(1)
	P. triseriata	chorus frog	(1)
Ranidae	*Rana catesbeiana*	bullfrog	(1)
	R. clamitans	green frog	(1)
	R. pipiens	Northern leopard frog	(1)

References:

Conant, R. and J.T. Collins, 1991, *Reptiles and Amphibians, Eastern/Central North America* , Peterson Field Guide, Third Edition, Houghton Mifflin Company, Boston.

Pfingsten, R.A. and F.L. Downs (eds.), 1989, *Salamanders of Ohio* , Ohio Biological Survey Bulletin, New Series, Vol. 7, No. 2, 315 pages, 29 pls.

Reference for on-site observation:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1995).

Table 2-6

Fish Species Observed at
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site	Habitat[a]
Catostomidae	*Catostomus commersoni*	white sucker	(1)	lotic
Centrarchidae	*Lepomis cyanellus*	green sunfish	(1)	lentic, lotic
	Lepomis species	green sunfish hybrid	(1)	lentic
	L. gibbosus	pumpkinseed sunfish	(1)	lentic
	L. macrochirus	bluegill	(1)	lentic
	Micropterus salmoides	largemouth bass	(1)	lentic
Cyprinidae	*Campostoma anomalum*	central stoneroller	(1)	lotic
	Carassius auratus	goldfish	(1)	lentic
	Luxilus chrysocephalus	striped shiner	(1)	lotic
	Pimephales notatus	bluntnose minnow	(1)	lotic
	P. promelas	fathead minnow	(1)	lotic
	Semotilus atromaculatus	creek chub	(1)	lotic
Gasterosteidae	*Culaea inconstans*	brook stickleback	(1)	lotic
Ichtaluridae	*Ameiurus melas*	black bullhead	(1)	lentic

[a] Lotic - Flowing water such as brooks, ditches, and creeks.
Lentic - Still waters such as ponds and lakes.

Reference for on-site observation:
(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1994).

Table 2-7

Summary of Samples Evaluated in the Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

Location	Sample Number	Sample Purpose	Sample Date	Depth (ft)	Analyses
Soil Samples					
PBOW99-SBA102A	PBOW99SBA102A	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SBA103A	PBOW99SBA103A	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SBA103B	PBOW99SBA103B	REG	10-Jun-99	1 - 4	Metals, SVOC
PBOW99-SBA104B	PBOW99SBA104B	REG	10-Jun-99	0 - 1	Metals, SVOC
PBOW99-SSA101	PBOW99SSA101	REG	10-Jun-99	0 - 0	Metals, SVOC
PBOW99-SBA101A	PBOW99SBA101A	REG	11-Jun-99	0 - 0.5	Metals, SVOC
PBOW99-SBA101A	PBOW99SBA101A-DUP	FD	11-Jun-99	0 - 0.5	Metals, SVOC
ASH PIT 1-SB01	AP0001	REG	8-Dec-08	0.5 - 1.5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB01	AP0002	REG	8-Dec-08	3.5 - 5.5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB02	AP0004	REG	8-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB02	AP0005	REG	8-Dec-08	3 - 3.8	Exp, Metals, SVOC
ASH PIT 1-SB06	AP0017	REG	8-Dec-08	0.8 - 1.8	Exp, Metals, PCBs SVOC
ASH PIT 1-SB06	AP0018	REG	8-Dec-08	5 - 5.8	Exp, Metals, PCBs SVOC
ASH PIT 1-SB09	AP0026	REG	8-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB09	AP0027	REG	8-Dec-08	3 - 4	Exp, Metals, PCBs SVOC
ASH PIT 1-SB03	AP0007	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB03	AP0008	REG	9-Dec-08	3 - 5	Exp, Metals, PCBs SVOC
ASH PIT 1-SB04	AP0010	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB04	AP0011	REG	9-Dec-08	3 - 4	Exp, Metals, Pest, PCB, SVOC
ASH PIT 1-SB04	AP0012	FD	9-Dec-08	3 - 4	Exp, Metals, Pest, PCB, SVOC
ASH PIT 1-SB05	AP0014	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB05	AP0015	REG	9-Dec-08	3 - 3.7	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0023	REG	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0063	FD	9-Dec-08	0 - 1	Exp, Metals, PCBs SVOC
ASH PIT 1-SB08	AP0024	REG	9-Dec-08	3 - 5	Exp, Metals, PCBs SVOC
Sediment Samples					
AP1-SD01	AP1007	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD02	AP1008	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD03	AP1012	REG	19-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP1-SD04	AP1013	REG	20-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
Surface Water Samples					
AP1-SW01	AP2007	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW02	AP2008	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW03	AP2012	REG	19-May-09	NA	Exp, Metals, PCB, SVOC
AP1-SW04	AP2013	REG	20-May-09	NA	Exp, Metals, PCB, SVOC

FD - Field duplicate.
Exp - Explosives.
NA - Not applicable.
Pest - Organochlorine pesticide.
PCB - Polychlorinated biphenyl.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Table 2-8

Statistical Summary and COPEC Selection for Chemicals Detected in Soil (0 to 6 feet bgs)
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]	Distribution [e]	95% UCL [e] (mg/kg)	EPC [f] (mg/kg)	UCL 0-1' soil depth [g] (mg/kg)	MDC 0-1' soil depth [g] (mg/kg)	EPC 0-1' soil depth [g] (mg/kg)
Inorganics																		
Aluminum	22 / 22	100	2.77E+03		1.66E+04		3.31E+00	4.89E+01	9.19E+03	1.55E+04	pH Dependent	N (d)			---			---
Antimony	7 / 22	32	2.58E-01	J	8.38E-01		4.23E-01	2.60E+00	4.76E-01	9.30E+00	0.27	N (b)			---			---
Arsenic	22 / 22	100	3.57E+00		3.12E+01		8.46E-01	2.60E+00	1.07E+01	3.65E+01	18	N (b)			---			---
Barium	22 / 22	100	1.30E+01		1.68E+02		1.65E-01	4.89E+01	8.32E+01	8.26E+02	330	N (a)			---			---
Beryllium	17 / 22	77	1.50E+00		1.65E+01	J	1.65E-01	1.20E+00	7.00E+00	1.00E+00	21	N (a)			---			---
Cadmium	4 / 22	18	2.60E-01	J/U	3.45E-01	J	2.50E-01	6.10E-01	2.43E-01		0.36	N (a)			---			---
Calcium	22 / 22	100	2.68E+03		5.91E+04		4.72E+00	1.22E+03	1.83E+04	5.23E+04	Nutrient	N (c)			---			---
Chromium	22 / 22	100	5.51E+00		2.07E+01		4.13E-01	1.30E+00	1.31E+01	2.90E+01	26	N (a)			---			---
Cobalt	21 / 22	95	3.23E+00		2.79E+01		1.65E-01	1.22E+01	1.01E+01	1.16E+02	13	N (b)			---			---
Copper	22 / 22	100	7.71E+00		5.00E+01		4.13E-01	6.10E+00	2.52E+01	5.62E+01	28	N (b)			---			---
Iron	22 / 22	100	1.06E+04		9.51E+04		3.31E+00	2.62E+01	4.29E+04	2.34E+05	pH Dependent	N (b)			---			---
Lead	22 / 22	100	4.90E+00		2.71E+01		3.80E-01	7.90E-01	9.70E+00	4.86E+01	11	N (b)			---			---
Magnesium	21 / 22	95	6.51E+02		1.65E+04		1.65E+00	1.22E+03	4.76E+03	1.04E+04	Nutrient	N (c)			---			---
Manganese	22 / 22	100	1.25E+02		2.81E+03		1.65E-01	3.90E+00	5.71E+02	3.51E+03	220	N (b)			---			---
Mercury	12 / 22	55	1.24E-02	J	3.83E-01		2.12E-02	2.40E-01	6.76E-02	8.50E-02	0.00051	Y	Gamma	9.35E-02	9.35E-02	1.39E-01	3.83E-01	1.39E-01
Nickel	13 / 22	59	1.71E+00		7.92E+01		2.48E-01	9.80E+00	1.34E+01	5.51E+01	38	N (d)			---			---
Potassium	20 / 22	91	1.64E+02		1.72E+03		2.07E+01	1.22E+03	8.84E+02	3.39E+03	Nutrient	N (c)			---			---
Selenium	11 / 22	50	4.97E-01	J/U	2.70E+00		6.30E-01	1.30E+00	7.79E-01	2.00E+00	0.52	Y	Nonparametric	1.06E+00	1.06E+00	1.36E+00	2.70E+00	1.36E+00
Sodium	16 / 22	73	2.50E+01		1.65E+02		8.26E+00	1.22E+03	1.77E+02		Nutrient	N (c)			---			---
Thallium	8 / 22	36	2.39E-01	J	5.63E-01		4.23E-01	2.60E+00	4.59E-01	1.30E+00	1	N (a)			---			---
Vanadium	22 / 22	100	1.44E+01		3.92E+01		1.65E-01	1.31E+01	2.40E+01	4.09E+01	7.8	N (b)			---			---
Zinc	20 / 22	91	2.31E+01		9.58E+01		2.07E+00	5.20E+00	5.56E+01	3.22E+02	46	N (b)			---			---
Polychlorinated biphenyls (PCB)																		
Aroclor 1260	1 / 13	8	1.03E-01	/U	1.03E-01	/U	4.00E-02	2.69E-01	1.04E-01		0.371	N (a)			---			---
Semivolatile Organic Compounds																		---
Acenaphthylene	1 / 22	4.5	2.79E-01	JJ	2.79E-01	JJ	3.86E-01	2.37E+00	2.76E-01		29	N (a)			---			---
Anthracene	1 / 22	4.5	2.16E-01	JJ	2.16E-01	JJ	3.86E-01	2.37E+00	2.73E-01		29	N (a)			---			---
Benzo(a)anthracene	2 / 22	9	6.42E-02	J	8.56E-01	JJ	3.86E-01	2.37E+00	2.94E-01		1.1	N (a)			---			---
Benzo(a)pyrene	2 / 22	9	5.34E-02	J	7.21E-01	JJ	3.86E-01	2.37E+00	2.88E-01		1.1	N (a)			---			---
Benzo(b)fluoranthene	2 / 22	9	8.29E-02	J	1.21E+00	JJ	3.86E-01	2.37E+00	3.11E-01		1.1	Y	Nonparametric	4.58E-01	4.58E-01	8.29E-01	1.21E+00	8.29E-01
Chrysene	2 / 22	9	6.75E-02	J	8.50E-01	JJ	3.86E-01	2.37E+00	2.94E-01		1.1	N (a)			---			---
Dibenzofuran	1 / 22	4.5	7.57E-02	QJ	7.57E-02	QJ	3.86E-01	2.37E+00	3.02E-01		NSV	N (e)			---			---
Fluoranthene	3 / 22	14	4.77E-02	QJ	1.88E+00	JJ	3.86E-01	2.37E+00	3.36E-01		1.1	Y	Normal	3.56E-01	3.56E-01	1.10E+00	1.88E+00	1.10E+00
Indeno(1,2,3-cd)pyrene	2 / 22	9	3.12E-01	J	1.82E+00	JJ	3.86E-01	2.37E+00	3.49E-01		1.1	Y	Nonparametric	7.10E-01	7.10E-01	1.03E+00	1.82E+00	1.03E+00
Methylnaphthalene, 2-	2 / 22	9	3.63E-01	QJ	9.42E-01	J	3.86E-01	2.37E+00	3.04E-01		3.24	N (a)			---			---
Naphthalene	5 / 22	23	5.53E-02	J	7.64E-01	J	3.86E-01	2.37E+00	2.58E-01		29	N (a)			---			---
Phenanthrene	5 / 22	23	5.50E-02	J	8.31E-01	JJ	3.86E-01	2.37E+00	2.39E-01		29	N (a)			---			---
Pyrene	3 / 22	14	3.78E-02	QJ	1.32E+00	JJ	3.86E-01	2.37E+00	3.10E-01		1.1	Y	Normal	2.60E-01	2.60E-01	7.75E-01	1.32E+00	7.75E-01

bgs - Below ground surface.
BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
mg/kg - Milligrams per kilogram.
VQ - Validation qualifier (a "/" indicates combined VQs for a regular and field duplicate sample pair):
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
Q - Data is biased high due to a calibration error.
U - Not detected.
NSV - No screening value.
UCL - Upper confidence limit.

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas*** , Plum Brook Ordnance Works, Sandusky, Ohio, August.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
(d) - Statistical test shows background and site data to be the same; see Appendix C.
(e) - Infrequently detected (fewer than 5 percent of all samples)
[d] Y - Chemical is chosen as COPEC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (U.S. Environmental Protection Agency (EPA), 2010, ProUCL Version 4.00.05, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/software.htm.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] The EPC for the COPEC at the 0-1 feet soil depth range is used as the exposure concentration for some ecological receptors. Two samples (AP0001 and AP0017) with an end depth slightly greater than 1 foot were also used. See text for details.

Table 2-9

Statistical Summary and COPEC Selection for Chemicals Detected in Surface Water
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of values, µg/L: Detected Conc Minimum	VQ	Detected Conc Maximum	VQ	Reporting Limits Minimum	Reporting Limits Maximum	Arithmetic Mean µg/L	ESV [a] µg/L	COPEC? [b,c]	EPC [d] µg/L
Metals												
Aluminum	4 / 4	100	31.8	J	8770		200	200	2.23E+03	8.70E+01	Y	8.77E+03
Arsenic	1 / 4	25	8.3	J	8.3	J	10	10	5.83E+00	3.10E+00	Y	8.30E+00
Barium	4 / 4	100	31.9	J	80	J	200	200	4.56E+01	4.00E+00	Y	8.00E+01
Calcium	4 / 4	100	139000		222000		1000	1000	1.62E+05	Nutrient	N (b)	---
Chromium	1 / 4	25	13.9		13.9		10	10	7.23E+00	4.20E+01	N (a)	---
Cobalt	1 / 4	25	6.9	J	6.9	J	50	50	2.05E+01	2.30E+01	N (a)	---
Copper	1 / 4	25	19.2	J	19.2	J	25	25	1.42E+01	1.58E+00	Y	1.92E+01
Iron	3 / 4	75	26.6	J	15100		300	300	3.83E+03	1000/Nutrient	N (b)	---
Lead	3 / 4	75	2	J	15		10	10	6.03E+00	1.17E+00	Y	1.50E+01
Magnesium	4 / 4	100	26200		36900		5000	5000	2.90E+04	Nutrient	N (b)	---
Manganese	4 / 4	100	247		836		15	15	4.92E+02	1.20E+02	Y	8.36E+02
Nickel	1 / 4	25	26.2	J	26.2	J	40	40	2.16E+01	2.89E+01	N (a)	---
Potassium	4 / 4	100	2030	J	11800		10000	10000	4.51E+03	Nutrient	N (b)	---
Sodium	4 / 4	100	6400	J	9140	J	10000	10000	7.36E+03	Nutrient	N (b)	---
Vanadium	1 / 4	25	20	J	20	J	50	50	2.38E+01	1.20E+01	Y	2.00E+01
Zinc	4 / 4	100	9.6	J	93.2		20	20	3.17E+01	6.57E+01	Y	9.32E+01

ESV - Ecological screening value
EPC - Exposure point concentration
COPEC - Chemical of potential ecological concern
µg/L - Micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] ESVs and their sources are in Appendix B.
[b] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPEC.
[d] Due to the small sample size (i.e., < 5 samples), the maximum detected concentration is selected as the EPC.

Table 2-10

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	ESV [b] mg/kg	COPEC? [c,d]	EPC [e] mg/kg
Inorganics													
Aluminum	4 / 4	100	4.49E+03		9.88E+03		1.30E+01	2.40E+01	7.84E+03	1.55E+04	NSV	N (b)	---
Antimony	3 / 4	75	5.00E-01	J	1.30E+00	J	3.80E+00	7.30E+00	1.19E+00	9.30E+00	NSV	N (b)	---
Arsenic	4 / 4	100	4.00E+00		1.59E+01		5.10E-01	9.70E-01	9.20E+00	3.65E+01	9.79E+00	N (b)	---
Barium	4 / 4	100	3.13E+01		1.10E+02		1.30E+01	2.40E+01	5.86E+01	8.26E+02	NSV	N (b)	---
Beryllium	4 / 4	100	3.00E-01	J	1.60E+00		3.20E-01	6.10E-01	7.55E-01	1.00E+00	NSV	Y	1.60E+00
Cadmium	4 / 4	100	2.30E-01	J	5.90E-01		2.50E-01	4.80E-01	4.23E-01	NA	9.90E-01	N (a)	---
Calcium	4 / 4	100	1.04E+04		2.99E+04		3.20E+02	6.10E+02	1.77E+04	5.23E+04	Nutrient	N (c)	---
Chromium	4 / 4	100	7.80E+00		1.69E+01		6.40E-01	1.20E+00	1.30E+01	2.90E+01	4.34E+01	N (a)	---
Cobalt	4 / 4	100	4.40E+00		9.90E+00		3.20E+00	6.10E+00	8.08E+00	1.16E+02	5.00E+01	N (a)	---
Copper	4 / 4	100	1.05E+01		3.85E+01		1.60E+00	3.00E+00	2.27E+01	5.62E+01	3.16E+01	N (b)	---
Iron	4 / 4	100	9.27E+03		2.17E+04		6.40E+00	1.20E+01	1.79E+04	2.34E+05	Nutrient	N (c)	---
Lead	4 / 4	100	7.00E+00	J	2.37E+01		6.40E+00	1.20E+01	1.67E+01	4.86E+01	3.58E+01	N (a)	---
Magnesium	4 / 4	100	1.81E+03		9.37E+03		3.20E+02	6.10E+02	5.13E+03	1.04E+04	Nutrient	N (c)	---
Manganese	4 / 4	100	1.65E+02		1.67E+03		1.10E+00	9.10E+00	6.55E+02	3.51E+03	4.60E+02	N (b)	---
Mercury	4 / 4	100	2.10E-02	J	1.40E-01		1.00E-01	2.00E-01	7.38E-02	8.50E-02	1.80E-01	N (a)	---
Nickel	4 / 4	100	1.20E+01		2.67E+01		2.50E+00	4.80E+00	2.14E+01	5.51E+01	2.27E+01	N (b)	---
Potassium	4 / 4	100	7.25E+02	J	1.74E+03		6.40E+02	1.20E+03	1.24E+03	3.39E+03	Nutrient	N (c)	---
Selenium	3 / 4	75	3.20E-01	J	1.30E+00	J	6.40E+00	1.20E+01	1.44E+00	2.00E+00	NSV	N (b)	---
Silver	1 / 4	25	9.90E-02	J	9.90E-02	J	6.40E-01	1.20E+00	3.49E-01	1.11E+01	5.00E-01	N (a)	---
Sodium	2 / 4	50	8.31E+01	J	1.12E+02	J	6.40E+02	1.20E+03	2.79E+02	NA	Nutrient	N (c)	---
Vanadium	4 / 4	100	1.24E+01		2.55E+01		3.20E+00	6.10E+00	1.98E+01	4.09E+01	NSV	N (b)	---
Zinc	4 / 4	100	3.33E+01		1.37E+02		1.30E+00	2.40E+00	7.86E+01	3.22E+02	1.21E+02	N (b)	---
Polychlorinated Biphenyls													
Aroclor 1254	2 / 4	50	2.50E-02	J	3.52E-02	J	2.20E-02	4.10E-02	2.11E-02		5.98E-02	N (a)	---
Aroclor 1260	2 / 4	50	2.07E-02	J	1.13E-01	J	2.20E-02	4.10E-02	3.94E-02		5.98E-02	Y	1.13E-01
Semivolatiles Organic Compounds													
Benzo(a)anthracene	1 / 4	25	1.21E-01	J	1.21E-01	J	2.20E-01	1.10E+00	2.28E-01		1.08E-01	Y	1.21E-01
Benzo(a)pyrene	1 / 4	25	1.12E-01	J	1.12E-01	J	2.20E-01	1.10E+00	2.26E-01		1.50E-01	N (a)	---
Benzo(b)fluoranthene	1 / 4	25	1.75E-01	J	1.75E-01	J	2.20E-01	1.10E+00	2.41E-01		1.04E+01	N (a)	---
Chrysene	1 / 4	25	1.49E-01	J	1.49E-01	J	2.20E-01	1.10E+00	2.35E-01		1.66E-01	N (a)	---
Dibenzofuran	1 / 4	25	1.50E-01	J	1.50E-01	J	2.20E-01	1.10E+00	2.35E-01		4.49E-01	N (a)	---
Di-n-butyl phthalate	1 / 4	25	1.80E-01	J	1.80E-01	J	4.30E-01	2.20E+00	4.90E-01		1.11E+00	N (a)	---
Fluoranthene	1 / 4	25	1.91E-01	J	1.91E-01	J	2.20E-01	1.10E+00	2.45E-01		4.23E-01	N (a)	---
Methylnaphthalene, 2-	1 / 4	25	6.16E-01		6.16E-01		2.20E-01	1.10E+00	3.52E-01		2.02E-02	Y	6.16E-01
Naphthalene	1 / 4	25	3.37E-01	J	3.37E-01	J	2.20E-01	1.10E+00	2.82E-01		1.76E-01	Y	3.37E-01
Phenanthrene	1 / 4	25	3.06E-01	J	3.06E-01	J	2.20E-01	1.10E+00	2.74E-01		2.04E-01	Y	3.06E-01
Pyrene	1 / 4	25	1.95E-01	J	1.95E-01	J	2.20E-01	1.10E+00	2.46E-01		1.95E-01	Y	1.95E-01

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.

Table 2-10

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
NSV - No screening value available.
VQ - Validation qualifier.

[a] Soil background screening concentrations are used for sediment. See text for details.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPEC.
[e] Due to the small sample size (i.e., < 5 samples), the maximum detected concentration is selected as the EPC.

Table 3-1

Data Used to Model Exposure in the Indicator Wildlife Species
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

Indicator Species	Class/ Order	Average Body Weight[a] (kg)	Average Home Range[a] (ha)	Dietary Intake[a] (kg[dw]/day)	Soil/Sed. Intake (kg[dw]/day)	Water Intake (L/day)[b]	Trophic Level	Dietary Composition[a] (percent)
Deer mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	0.0148	0.062	0.0028[d]	0.000056 (2%)	0.0022	Omnivore	Terr. Inverts. : 39 Plants: 61
Eastern cottontail (*Sylvilagus floridanus*)	Mammalia/ Lagomorpha	1.132	3.1	0.096[d]	0.006 (6.3%)	0.11	Herbivore	Plants: 100
Short-tailed shrew (*Blarina brevicauda*)	Mammalia/ Insectivora	0.015	0.39	0.0022[d]	0.00023 (10.4%)	0.0023	Insectivore	Terr. Inverts.: 100
White-tailed deer (*Odocoileus virginianus*)	Mammalia/ Artiodactyla	61[c]	518[c]	2.0[d]	0.04 (2%)	4	Herbivore	Plants: 100
Marsh wren (*Cistothorus palustris*)	Aves/ Passeriformes	0.01	0.054	0.0029[d]	0.000058 (2%)	0.0027	Insectivore	Terr. Inverts.: 100
Red-tailed hawk (*Buteo jamaicensis*)	Aves/ Falconiformes	0.957	842	0.057[d]	0.00114 (2%)	0.057	Carnivore	Rabbits: 25.3 Shrews: 25.3 Mice: 25.3 Birds: 24
Muskrat[e] (*Ondata zibethicus*)	Mammalia/ Rodentia	1.174	0.13	0.352	negligible	0.11	Herbivore	Aquatic plants: 100
Raccoon (*Procyon lotor*)	Mammalia/ Carnivora	5.1	156	0.26[d]	0.024 (9.4%) (assumed 50% soil and 50% sediment)	0.43	Omnivore	Aq. Inverts.: 21 Terr. Inverts.: 30 Mice: 5 Plants: 42 (50% terrestrial, 50% aquatic) Fish: 2

[a] From EPA (1993), except as noted.

[b] Allometric equations for mammals and birds from EPA (1993), as follows:

Mammals: WI (water ingestion; L/day) = 0.099 $Wt^{0.90}$ (kg), where Wt = body weight.

Birds: WI (L/day) = 0.059 $Wt^{0.67}$ (kg).

[c] Information is from *A Guide to the Mammals of Ohio* (Gottschang, 1981).

[d] Allometric equation for mammals: FI (kg/day) = 0.0687 $Wt^{0.822}$ for shrew, deer, and raccoon; FI (g/day) = 0.621 $Wt^{0.564}$ for rodents (deer mouse); and FI (g/day) = 0.577 $Wt^{0.727}$ for small herbivores (cottontail).
Allometric equation for birds: FI (kg/day) = 0.0582 Wt0.651 (EPA, 1993), where FI = food ingestion (dry weight) and Wt = body weight. Allometric equations from EPA (1993).

[e] Exposure parameters obtained from OEPA-DERR (2008) Ecological Risk Assessment Guidance Document, Revised April 2008, On line: http://www.epa.ohio.gov/portals/30/rules/RR-031.pdf.

References

U.S. Environmental Protection Agency (EPA), 1993, *Wildlife Exposure Factors Handbook* , Vols. I and II, Office of Research and Development, Washington, D.C., EPA/600/R-93/187a.

Table 3-2

Bioaccumulation Factors or Regression
Equations Utilized for the Soil-to-Plant and Sediment-to-Aquatic Plant Pathways
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

COPEC in Soil or Sediment	EPA, 2008	Efroymson et al., 2001				Other BAF/BCF (1)	Regression Equation (2)	Recommended BAF/BCF (3)	Source
		Minimum BAF/BCF	Median BAF/BCF	90th Percentile BAF/BCF[b]	Maximum BAF/BCF				
Inorganics									
Beryllium	ln (AGP)=0.7345(ln[soil])-0.5361	--	--	--	--	--	--	Eco-SSL Regression	EPA (2008), Table 4a
Mercury	--	0.0015	0.65	5.0	12	0.55 a	ln (AGP)=0.54(ln[soil])-1.00	Regression Equation	Efroymson et al. (2001)
Selenium	ln (AGP)=1.104(ln[soil])-0.677	0.02	0.67	3.0	77	0.025 a	ln (AGP)=0.56(ln[soil])+1.58	Eco-SSL Regression	EPA (2008), Table 4a
PCBs									
Aroclor 1260	--	--	--	--	--	--	Log (BCF)=-0.578(Log[Kow])+1.588	0.00064	Travis & Arms Kow Regression Eq.
SVOCs									
2-Methylnaphthalene	--	--	--	--	--	--	Log (BCF)=-0.578(Log[Kow])+1.588	0.27	Travis & Arms Kow Regression Eq.
Benzo(a)anthracene	ln (AGP)=0.5944(ln[soil])-2.7078	--	--	--	--	--	--	Eco-SSL Regression	EPA (2008), Table 4b
Benzo(b)fluoranthene	0.31	--	--	--	--	0.31 b	--	0.31	EPA (2008), Table 4b
Fluoranthene	0.5	--	--	--	--	0.5 b	--	0.5	EPA (2008), Table 4b
Indeno(123-cd)pyrene	0.11	--	--	--	--	0.11 b	--	0.11	EPA (2008), Table 4b
Naphthalene	12.2	--	--	--	--	12.2 b	--	12.2	EPA (2008), Table 4b
Phenanthrene	ln (AGP)=0.6203(ln[soil])-0.1665	--	--	--	--	--	--	Eco-SSL Regression	EPA (2008), Table 4b
Pyrene	0.72	--	--	--	--	0.72 b	--	0.72	EPA (2008), Table 4b

Notes:

1. For inorganic chemicals without BAF/BCF data, BAF/BCFs were derived from the Baes, et al. (1984) and IAEA (1994) data.
2. Efroymson, R.A., et. al., 2001, *Uptake of Inorganic Chemicals from Soil by Plant Leaves: Regressions of Field Data*, Environ. Tox. Chem., 20:2561-2571 for above ground plant tissue concentration and Travis and Arms (1988) for BCF.
3. For the values estimated using Travis and Arms (1988) K_{ow} regression equation, K_{ow} values were obtained using the K_{ow} WIN application in EPA's EPI Suite software (http://www.epa.gov/oppt/exposure/pubs/episuite.htm).

-- indicates that a BAF/BCF or regression equation is not available.

[a] Average of the vegetative and reproductive transfer factors presented in Baes, et al. (1984); note: value from this reference used if no appropriate value available from IAEA (1994).
[b] From USEPA (2008).
BAF - Bioaccumulation factor.
BCF - Bioconcentratioin factor.
EPA - U.S. Environmental Protection Agency.
IAEA - International Atomic Energy Agency.

References:

Baes, C. F., R.D. Sharp, A.L. Sjoreen and R. W. Shor (1984). *A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture*. ORNL-5786, September 1984.
Efroymson, R.A., et. al., 2001, *Uptake of Inorganic Chemicals from Soil by Plant Leaves: Regressions of Field Data*, Environ. Tox. Chem., 20:2561-2571
EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)*, Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
International Atomic Energy Agency (IAEA) (1994). Handbook of parameter values for the prediction of radiocuclide transfer in temperate environments. Technical Reports Serices No. 364. June 24, 1994.

Table 3-3

Bioaccumulation Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway Ash Pit 1 Plum Brook Ordnance Works, Sandusky, Ohio

Constituent	PBOW Site-Specific BCF [a]	Sample, et al. 1998			Beyer, 1990 BAF/BCF	Regression Equation	Recommended BAF/BCF	Source of BAF/BCF	Rationale for BAF/BCF
		Median BAF/BCF	90th Percentile BAF/BCF	Maximum BAF/BCF					
Inorganics									
Mercury	--	1.693	20.625	33	--	ln (EW)=0.33(ln[soil])+0.078	Regression Equation	Sample et al. 1998	Chemical-specific regression equation
Selenium	--	0.985	1.34	13.733	--	ln (EW)=0.733(ln[soil])-0.075	Regression Equation	EPA 2008, Table 4a	Chemical-specific regression equation
Semivolatile Organics									
Benzo(b)fluoranthene	0.21	--	--	--	0.32	--	0.21	Site field study	Plum Brook site-specific BAF (IT, 2001)
Fluoranthene	0.21	--	--	--	0.079	--	0.21	Site field study	Plum Brook site-specific BAF (IT, 2001)
Indeno(123-cd)pyrene	0.51	--	--	--	0.42	--	0.51	Site field study	Plum Brook site-specific BAF (IT, 2001)
Pyrene	0.45	--	--	--	0.092	--	0.45	Site field study	Plum Brook site-specific BAF (IT, 2001)

-- indicates that a BAF/BCF or regression equation is not available.
BAF - Bioaccumulation factor.
BCF - Bioconcentration factor.
[a] IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.

K_{ow} values obtained from U.S. Environmental Protection Agency (EPA) EPI Suite Version 4.0, http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

References:

Beyer, W.N., 1990, *Evaluating Soil Contamination, Biological Report 90(2)* , U.S. Department of the Interior, U.S. Fish and Wildlife Service.
EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)* , Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.
Sample, B. E, et. al., 1998, *Development and Validation of Bioaccumulation Models for Earthworms* , ES/ER/TM-220.

Table 3-4

Bioaccumulation Factors or Regression Equations Utilized for the
Soil-to-Mammal/Bird[a] Pathway
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

Constituent	Sample et al., (1998)						EPA (1999)	Other BAF		Regression Equation	Recommended BAF	Rationale for Recommended BAF
	Insectivore Median BAF	Herbivore Median BAF	Omnivore Median BAF	General[b] Median BAF	General[b] Maximum BAF	General[b] 90th percentile BAF	Maximum BAF Avian or Mammal					
Inorganics												
Mercury	1.046	0.0239[c]	0.0543	0.0543	1.046	0.192	--	--	--	--	0.192	"General: 90th Percentile" used because of uncertainties regarding the type of mammalian prey items.
Selenium	0.7241	0.0221[d]	0.2062	0.1619	1.754	1.1867	--	--	--	ln (M)=0.3764(ln[soil]) -0.4158	Regression	EPA (2008)-Attach 4-1, Table 4a
Semivolatile Organics												
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	0	EPA (2008) recommendation for PAHs
Fluoranthene	--	--	--	--	--	--	--	--	--	--	0	EPA (2008) recommendation for PAHs
Indeno(123-cd)pyrene	--	--	--	--	--	--	--	--	--	--	0	EPA (2008) recommendation for PAHs
Pyrene	--	--	--	--	--	--	--	--	--	--	0	EPA (2008) recommendation for PAHs

-- indicates that a BAF is not available.
BAF - Bioaccumulation factor.
PAH - Polycyclic aromatic hydrocarbon.
EPA - U.S. Environmental Protection Agency.
[a] Bird BAF values were based on the recommended small mammal BAF values, as bird uptake values are not readily available.
[b] "General" indicates that the combination dataset used for insectivore, herbivore, and omnivore receptors was used to estimate a "general" receptor BAF value.
[c] Only one BAF value available for exposure to mercury in soil (median is also 90th percentile value and maximum value).
[d] Mean value presented, as median value not given in Sample, et al. (1998).

References:

EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)* , Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
EPA, 1999, *Screening level ecological risk assessment protocol for hazardous waste combustion facilities* , August, EPA530-D-99-001A.
Sample et al., 1998, *Development and Validation of Bioaccumulation Models for Small Mammals,* ES/ER/TM-219.

Table 3-5

Bioaccumulation Factors Utilized
for the Sediment-to-Benthic Invertebrate Pathway
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

Constituent	PBOW Site-Specific BCFs [a]	Bechtel Jacobs (1998)			EPA (1999) BAF/BCF (dry weight)	Other BAF/BCF (dry weight)	Recommended BAF/BCF (dry weight)	Rationale for Recommended BAF/BCF
		Median BAF/BCF (dry weight)	90th Percentile BAF/BCF (dry weight)	Maximum BAF/BCF (dry weight)				
Inorganics								
Beryllium	--	--	--	--	5.39 [b]	--	5.39	EPA, 1999
PCBs								
Aroclor 1260	--	4.67	21.89	51.31	3.2	--	3.2	EPA (1999) BAF based on empirical data; based on Aroclor 1254
Semivolatile Organics								
2-Methylnaphthalene	--	--	--	--	--	4.3/4.9 [d]	4.3/4.9	Based on naphthalene
Benzo(a)anthracene	--	--	--	--	1.45	1.07/1.23 [d]	1.45	EPA (1999) BAF based on empirical data; based on benzo(a)pyrene
Naphthalene	--	--	--	--	--	4.3/4.9 [d]	4.3/4.9	Maruya et al. (1997) BAF based on empirical data
Phenanthrene	--	--	--	--	--	0.88/1 [d]	0.88/1	Maruya et al. (1997) BAF based on empirical data
Pyrene	--	--	--	--	--	1.3/1.49 [d]	1.3/1.49	Maruya et al. (1997) BAF based on empirical data

-- indicates that a BAF/BCF or regression equation is not available.
BAF - Bioaccumulation factor.
BCF - Bioconcentration factor.
EPA - U.S. Environmental Protection Agency.

[a] IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.

[b] Empirical data not available in EPA, 1999. Value presented is based on the mean of 6 recommended values for metals with empirical data as presented in Table C-6 (EPA, 1999).

[d] Maruya, K.A., R.W. Risebrough, and A.J. Horne, 1997, *The bioaccumulation of polynuclear aromatic hydrocarbons by benthic invertebrates in an intertidal marsh* , Environmental Toxicology and Chemistry, 16: 1087 - 1097. The polycyclic aromatic hydrocarbon (PAH) biota-sediment accumulation factors (BSAF) for polychaetes or clams (naphthalene only) were averaged. The averaged values were then adjusted using the average percent lipid content in the study (polychaetes = 1.6%, clams = 1.1%) and site-specific organic carbon contents of 3.2% for Ash Pit 1 (average of two samples; first BAF) and 2.8% (one sample; second BAF) for Ash Pit 3. An adjustment was also made for converting the BSAFs from wet weight to dry weight (DW), assuming 83.3% moisture content. The final dry weight BAFs were calculated using the following equation:
$BSAF_{DW}$ = Avg BSAF x (Flipid/Foc) x 1/(1- % moisture/100)

References:

Bechtel Jacobs Company LLC, 1998, *Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation* , BJC/OR-112. (Depurated and nondepurated results used).

EPA, 2000, *Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment* , USEPA Bioaccumulation Analysis Workgroup, February.

EPA, 1999, *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* , EPA530-D-99-001A (Peer Review Draft). **Note:** Only values based on empirical studies were used. Values were reported on a wet weight basis. Values were multiplied by 5.99 to convert to a dry-weight basis (see EPA, 1999).

Table 3-6

Bioaccumulation Factors and Regression Equations Utilized for the Surface Water-to-Fish Pathway Ash Pit 1 Plum Brook Ordnance Works, Sandusky, Ohio

Constituent	PBOW Site-Specific BCFs [a]	EPA (1999) BAF/BCF [b] (dry weight)	EPA (1989) BAF/BCF [c] (dry weight)	RAIS Database [d] (dry weight)	Regression Equation	Recommended BCF	Rationale for Recommended BAF/BCF
Inorganic Chemicals							
Aluminum	780	13.5	--	2,500	--	780	Site specific BCF (IT, 2001)
Arsenic	174	570	1,750	1,500	--	174	Site specific BCF (IT, 2001)
Barium	146	3165	--	20	--	146	Site specific BCF (IT, 2001)
Copper	1211.5	3,550	5,915	1,000	--	1211.5	Site specific BCF (IT, 2001)
Lead	63.8	0.45	895	1,500	--	63.8	Site specific BCF (IT, 2001)
Manganese	247	--	--	2,000		247	Site specific BCF (IT, 2001)
Vanadium	445.5	--	--	--		445.5	Site specific BCF (IT, 2001)
Zinc	1217	10,295	2,890	5,000	--	1217	Site specific BCF (IT, 2001)

-- indicates that a BAF/BCF or regression equation is not available.

BAF - Bioaccumulation factor.

BCF - Bioconcentration factor.

EPA - U.S. Environmental Protection Agency.

IT - IT Corporation.

[a] Values are from IT, 2001. The listed BCF is the average of the West Area Red Water Pond reasonable maximum exposure value, and the average of the BCFs for the three aquatic organisms evaluated for the Pentolite Road area.

[b] Values are from EPA, 1999, adjusted to dry weight by multiplying by a factor of 5.

[c] Values are from EPA, 1989, and assumed to be in wet weight; adjusted to dry weight by multiplying by a factor of 5.

[d] Values are from Risk Assessment Information System (RAIS), current as of June 2010. Values were assumed to be in wet weight and were adjusted to dry weight by multiplying by a factor of 5.

References:

Bintein, S., and J. Devillers, 1992, *Nonlinear Dependence of Fish Bioconcentration on n-Octanol/Water Partition Coefficient* , CTIS.

EPA, 1999, *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* , EPA530-D-99-001A (Peer Review Draft).

EPA, 1989, *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish* , EPA503-8-89-002.

IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.

Risk Assessment Information System (RAIS), on-line database, current as of June 2007, http://rais.ornl.gov

Table 4-1

Toxicity Reference Values for Mammals
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Inorganics								
Aluminum	--	1.93	mouse	Sample, et al. (1996)	--	19.3	mouse	Sample, et al. (1996)
Arsenic	--	0.126	mouse	Sample, et al. (1996)	--	1.26	mouse	Sample, et al. (1996)
Barium	--	5.1	rat	Sample, et al. (1996)	--	19.8	rat	Sample, et al. (1996)
Beryllium	--	0.66	rat	Sample, et al. (1996)	0.66 (NOAEL)	3.3	rat	Sample, et al. (1996)
Copper	--	11.7	mink	Sample, et al. (1996)	--	15.14	mink	Sample, et al. (1996)
Lead	--	8	rat	Sample, et al. (1996)	--	80	rat	Sample, et al. (1996)
Manganese	--	88	rat	Sample, et al. (1996)	--	284	rat	Sample, et al. (1996)
Mercury (mink)	--	1	mink	Sample, et al. (1996)	1.0 (NOAEL)	5	mink	Sample, et al. (1996)
Mercury (mouse)	--	13	mouse	Sample, et al. (1996)	--	132	mouse	Sample, et al. (1996)
Selenium	--	0.2	rat	Sample, et al. (1996)	--	0.33	rat	Sample, et al. (1996)
Vanadium	--	0.21	rat	Sample, et al. (1996)	--	2.1	rat	Sample, et al. (1996)
Zinc	--	160	rat	Sample, et al. (1996)	--	320	rat	Sample, et al. (1996)
PCBs								
Aroclor-1260 (Aroclor-1254)	--	0.068	mouse	Sample, et al. (1996)	--	0.68	mouse	Sample, et al. (1996)
Semivolatile Organics								
2-Methylnaphthalene	--	2.45	rat	LANL (2010)	--	12.25	rat	LANL (2010)
Benzo(a)anthracene	--	1	mouse	Sample et al, (1996) B(a)P as surrogate	--	10	mouse	B(a)P as surrogate
Benzo(b)fluoranthene	40 (chronic LOAEL)	4	rodent	LANL (2010)	--	20	rodent	LANL (2010)
Fluoranthene	--	1	mouse	B(a)P as surrogate	--	10	mouse	B(a)P as surrogate
Indeno(1,2,3-cd)pyrene	72 (chronic LOAEL)	7.2	rodent	LANL (2010)	--	36	rodent	LANL (2010)
Naphthalene	--	14.3	multiple sp.	LANL (2010)	--	71.5	multiple sp.	LANL (2010)
Phenanthrene	514 (acute NOAEL)	5.14	rat	LANL (2010)	--	25.7	rat	LANL (2010)
Pyrene	75 (subchronic NOAEL)	7.5	mouse	LANL (2010)	--	37.5	mouse	LANL (2010)

LOAEL - Lowest-observed-adverse-effects level.

mg/kg/d - Milligrams per kilogram per day.

NOAEL - No-observed-adverse-effect level.

REFERENCES

Los Alamos National Laboratory (LANL), 2010, ECORISK Database (Release 2.5), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, NM, October.

Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996, Toxicological Benchmarks for Wildlife, 1996 Revision, Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Table 4-2

Toxicity Reference Values for Birds
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

COPEC	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Inorganics								
Aluminum	--	110	ringed dove	Sample, et al. (1996)	--	1100	ringed dove	Sample, et al. (1996)
Arsenic	--	5.14	mallard duck	Sample, et al. (1996)	--	12.84	mallard duck	Sample, et al. (1996)
Barium	--	20.8	chicks	Sample, et al. (1996)	--	41.7	chicks	Sample, et al. (1996)
Beryllium	NA							
Copper	--	47	chicks	Sample, et al. (1996)	--	61.7	chicks	Sample, et al. (1996)
Lead (quail)	--	1.13	Japanese quail	Sample, et al. (1996)	--	11.3	Japanese quail	Sample, et al. (1996)
Lead (kestrel)	--	3.85	Am. Kestrel	Sample, et al. (1996)	--	38.5	Am. Kestrel	Sample, et al. (1996)
Manganese	--	977	Japanese quail	Sample, et al. (1996)	--	9770	Japanese quail	Sample, et al. (1996)
Mercury	--	0.45	Japanese quail	Sample, et al. (1996)	--	0.9	Japanese quail	Sample, et al. (1996)
Selenium (duck)	--	0.5	mallard duck	Sample, et al. (1996)	--	1	mallard duck	Sample, et al. (1996)
Selenium (owl)	--	0.44	screech owl	Sample, et al. (1996)	--	1.5	screech owl	Sample, et al. (1996)
Vanadium	--	11.38	mallard duck	Sample, et al. (1996)	--	113.8	mallard duck	Sample, et al. (1996)
Zinc	--	14.5	hens	Sample, et al. (1996)	--	131	hens	Sample, et al. (1996)
PCBs								
Aroclor-1260 (Aroclor-1254)	--	0.2	ring neck pheasant	Sample, et al. (1996)	--	1.8	ring neck pheasant	Sample, et al. (1996)
Semivolatile Organics								
2-Methylnaphthalene	--	22.8	Mallard	Naphthalene as surrogate; Patton and Dieter (1980)	--	228	Mallard	Naphthalene as surrogate; Patton and Dieter (1980)
Benzo(a)anthracene	7 (subchronic NOAEL)	0.7	Bobwhite quail	LANL (2010)	--	3.5	Bobwhite quail	LANL (2010)
Benzo(b)fluoranthene	--	0.14	chicken	EPA (1999)	--	0.7	chicken	EPA (1999)
Fluoranthene	--	39.5	chicken	Rigdon and Neal (1963)	--	395	chicken	Rigdon and Neal (1963)
Indeno(1,2,3-cd)pyrene	--	1	chicken	EPA (1999)	--	5	chicken	EPA (1999)
Napthalene	1500 (acute NOAEL)	15	Bobwhite quail	LANL (2010)	--	75	Bobwhite quail	LANL (2010)
Phenanthrene	--	1	chicken	Based on Benzo(a)pyrene	--	5	chicken	Based on Benzo(a)pyrene
Pyrene	--	39.5	chicken	Rigdon and Neal (1963)	--	395	chicken	Rigdon and Neal (1963)

LOAEL - Lowest-observed-adverse-effect level.
mg/kg/d - Milligrams per kilogram per day.
NA - No toxicity value available
NOAEL - No-observed-adverse-effect level.

REFERENCES

Los Alamos National Laboratory (LANL), 2010, ECORISK Database (Release 2.5), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, NM, October.
EPA, 1999, *Screening level ecological risk assessment protocol for hazardous waste combustion facilities* , August, EPA530-D-99-001A.
Patton, J.F. and M.P. Dieter, 1980, "Effects of petroleum hydrocarbons on heptic function in the duck", *Comp. Biochem. Physiol.,* 65C:33-36.
Sample, B.E., D.M. Opresko, and G.W. Suter II, 1996, *Toxicological Benchmarks for Wildlife, 1996 Revision,* Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
Rigdon, R.H. and J. Neal, 1963, *Absorption and Excretion of Benzo(a)pyrene, Observation in the Duck, Chicken, Mouse, and Dog* . Texas Rep. Biol. And Med. 21(2):247-261.

Table 5-1

Wildlife Hazard Quotients for all Assessment Receptors
Ash Pit 1
Plum Brook Ordnance Works,
Sandusky, Ohio

COPEC	Deer Mouse		Short-tailed Shrew		Cottontail Rabbit		Marsh Wren		White-tailed Deer		Raccoon		Red-tailed Hawk		Muskrat	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Metals																
Aluminum	6.75E-01	6.75E-02	6.97E-01	6.97E-02	1.15E-01	1.15E-02	2.15E-02	2.15E-03	4.66E-04	4.66E-05	2.08E-02	2.08E-03	4.57E-06	4.57E-07	4.26E-01	4.26E-02
Arsenic	9.79E-03	9.79E-04	1.01E-02	1.01E-03	1.67E-03	1.67E-04	4.36E-04	1.75E-04	6.75E-06	6.75E-07	8.96E-05	8.96E-06	9.25E-08	3.70E-08	6.17E-03	6.17E-04
Barium	2.33E-03	6.01E-04	2.41E-03	6.20E-04	3.98E-04	1.03E-04	1.04E-03	5.18E-04	1.61E-06	4.14E-07	1.90E-05	4.89E-06	2.20E-07	1.10E-07	1.47E-03	3.79E-04
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	0.00E+00	0.00E+00	8.26E-04	1.65E-04	NA	NA	3.75E-01	7.51E-02
Copper	2.44E-04	1.89E-04	2.52E-04	1.94E-04	4.16E-05	3.22E-05	1.10E-04	8.40E-05	1.68E-07	1.30E-07	1.12E-05	8.69E-06	2.34E-08	1.78E-08	1.54E-04	1.19E-04
Lead	2.79E-04	2.79E-05	2.88E-04	2.88E-05	4.76E-05	4.76E-06	3.58E-03	3.58E-04	1.92E-07	1.92E-08	1.45E-06	1.45E-07	2.23E-07	2.23E-08	1.76E-04	1.76E-05
Manganese	1.41E-03	4.38E-04	1.46E-03	4.51E-04	2.41E-04	7.47E-05	2.31E-04	2.31E-05	9.73E-07	3.02E-07	1.66E-05	5.14E-06	4.90E-08	4.90E-09	8.90E-04	2.76E-04
Mercury	4.37E-03	4.30E-04	5.69E-03	5.60E-04	2.31E-04	2.27E-05	3.65E-01	1.83E-01	4.11E-07	4.04E-08	5.39E-05	1.08E-05	3.75E-06	1.88E-06	0.00E+00	0.00E+00
Selenium	8.64E-01	5.24E-01	7.90E-01	4.79E-01	8.82E-02	5.35E-02	6.88E-01	3.44E-01	1.44E-04	8.73E-05	7.92E-04	4.80E-04	9.98E-05	2.93E-05	0.00E+00	0.00E+00
Vanadium	1.42E-02	1.42E-03	1.46E-02	1.46E-03	2.42E-03	2.42E-04	4.75E-04	4.75E-05	9.76E-06	9.76E-07	2.66E-04	2.66E-05	1.01E-07	1.01E-08	8.92E-03	8.92E-04
Zinc	8.66E-05	4.33E-05	8.93E-05	4.47E-05	1.48E-05	7.39E-06	1.74E-03	1.92E-04	5.97E-08	2.98E-08	4.01E-06	2.00E-06	3.68E-07	4.07E-08	5.46E-05	2.73E-05
PCBs																
Aroclor 1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-04	3.16E-05	0.00E+00	0.00E+00	3.19E-04	3.19E-05
Semivolatile Organics																
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-05	1.34E-05	0.00E+00	0.00E+00	2.04E-02	4.07E-03
Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-05	1.23E-06	0.00E+00	0.00E+00	5.70E-03	5.70E-04
Benzo(b)fluoranthene	1.14E-02	2.28E-03	5.27E-03	1.05E-03	1.71E-03	3.42E-04	3.95E-01	7.90E-02	1.94E-06	3.87E-07	9.61E-06	1.92E-06	6.78E-06	1.36E-06	0.00E+00	0.00E+00
Fluoranthene	8.46E-02	8.46E-03	1.64E-02	1.64E-03	1.37E-02	1.37E-03	1.86E-03	1.86E-04	9.48E-06	9.48E-07	6.26E-05	6.26E-06	3.19E-08	3.19E-09	0.00E+00	0.00E+00
Indeno(1,2,3-cd)pyrene	7.77E-03	1.55E-03	8.88E-03	1.78E-03	5.50E-04	1.10E-04	1.59E-01	3.18E-02	6.57E-07	1.31E-07	8.49E-06	1.70E-06	1.18E-06	2.37E-07	0.00E+00	0.00E+00
Napthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-05	4.38E-06	0.00E+00	0.00E+00	8.62E-02	1.72E-02
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-06	1.61E-06	0.00E+00	0.00E+00	2.37E-02	4.74E-03
Pyrene	1.24E-02	2.48E-03	2.82E-03	5.63E-04	1.79E-03	3.58E-04	2.67E-03	2.67E-04	1.31E-06	2.63E-07	1.24E-05	2.47E-06	2.25E-08	2.25E-09	5.61E-03	1.12E-03

COPEC - Chemical of potential ecological concern.
LOAEL - Lowest-observed-adverse-effect level.
NA - No toxicity data available; hazard quotients not calculated.
NOAEL - No-observed-adverse-effect level.

Shaded cells indicate a hazard quotient greater than 1, when rounded. All hazard quotients at Ash Pit 1 were below 1 when rounded to one significant figure.

FIGURES

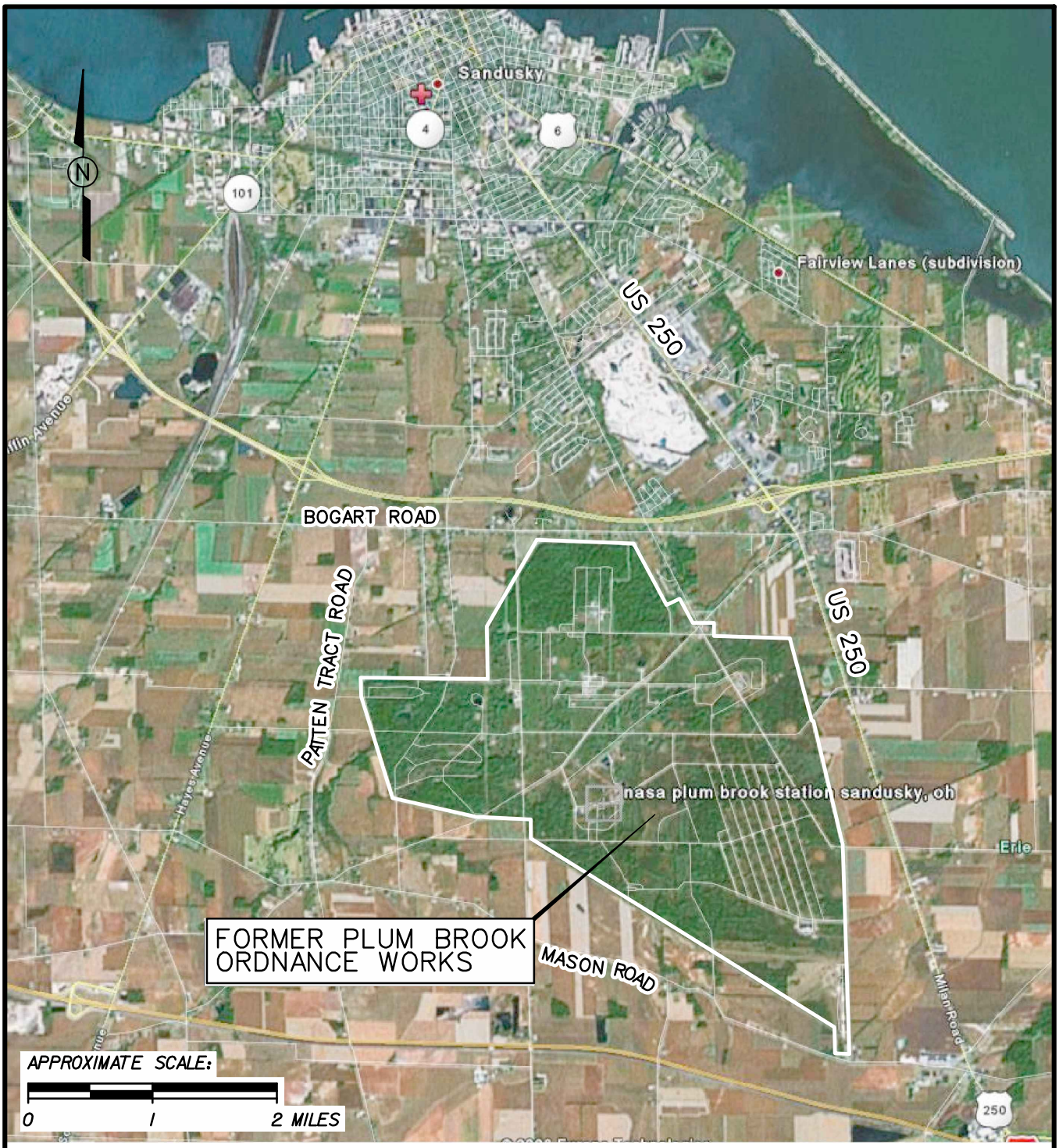

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 1 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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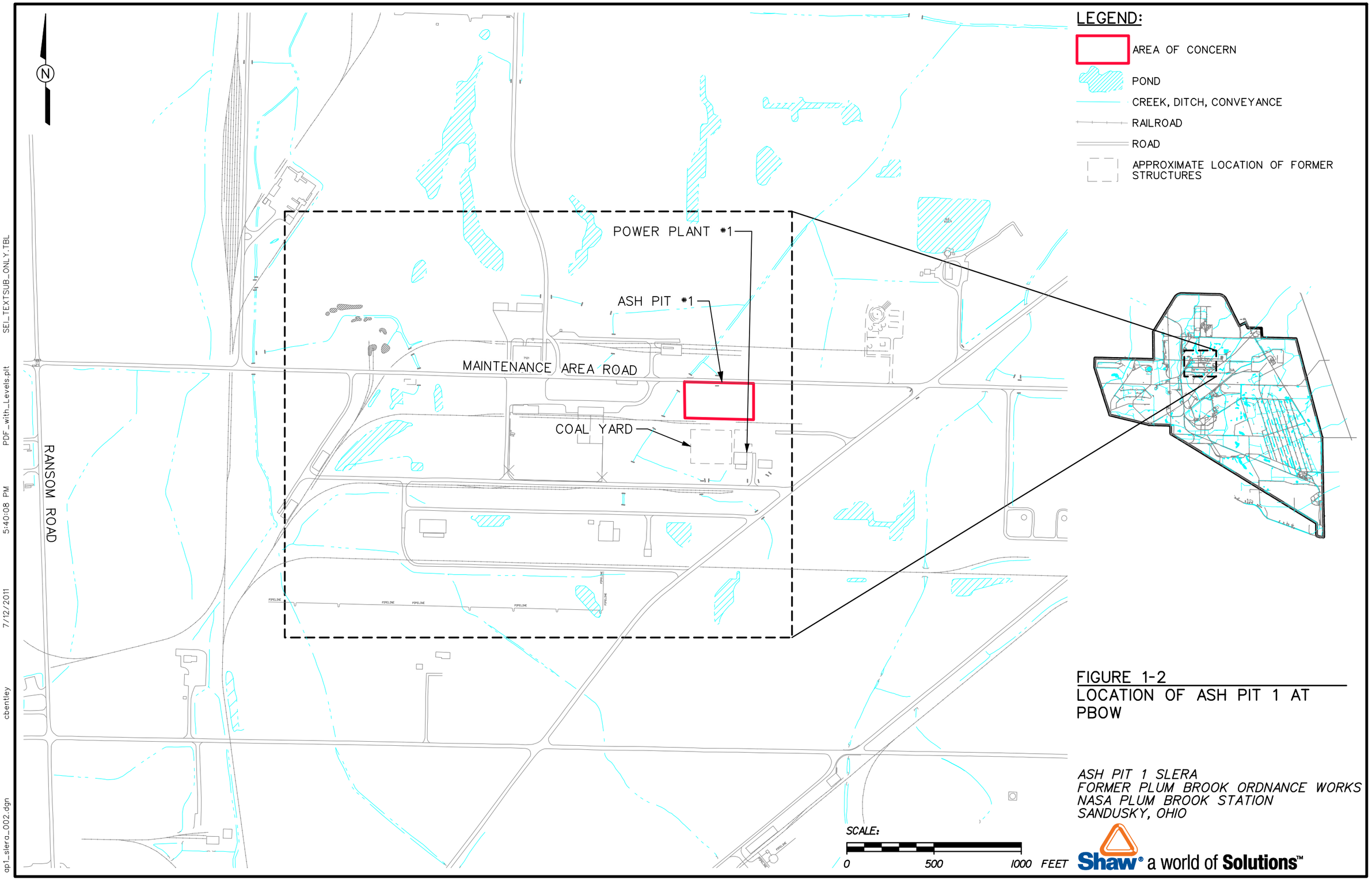


FIGURE 1-2
LOCATION OF ASH PIT 1 AT PBOW

ASH PIT 1 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

ap1_slera_002.dgn cbentley 7/12/2011 5:40:08 PM PDF_with_Levels.plt SEL_TEXTSUB_ONLY.TBL

Figure 2-1

Photographic Log for Ash Pit 1

(Page 1 of 3)

Photograph 1. Ash Pit 1. Edge of dogwood thicket (October, 2008).

Photograph 2. Ash Pit 1. Shrubs and dogwood thicket (October, 2008).

Figure 2-1

Photographic Log for Ash Pit 1

Photograph 3. Ash Pit 1. Unnamed ditch near northwest corner of site (October, 2008).

Photograph 4. Ash Pit 1. Power plant and mowed lawn south of the site (October, 2008).

Figure 2-1

Photographic Log for Ash Pit 1

Photograph 5. Ash Pit 1. Cleared vegetation from sampling activities (June, 2009).

Photograph 6. Ash Pit 1. Dogwood thicket and tire ruts (June, 2009).

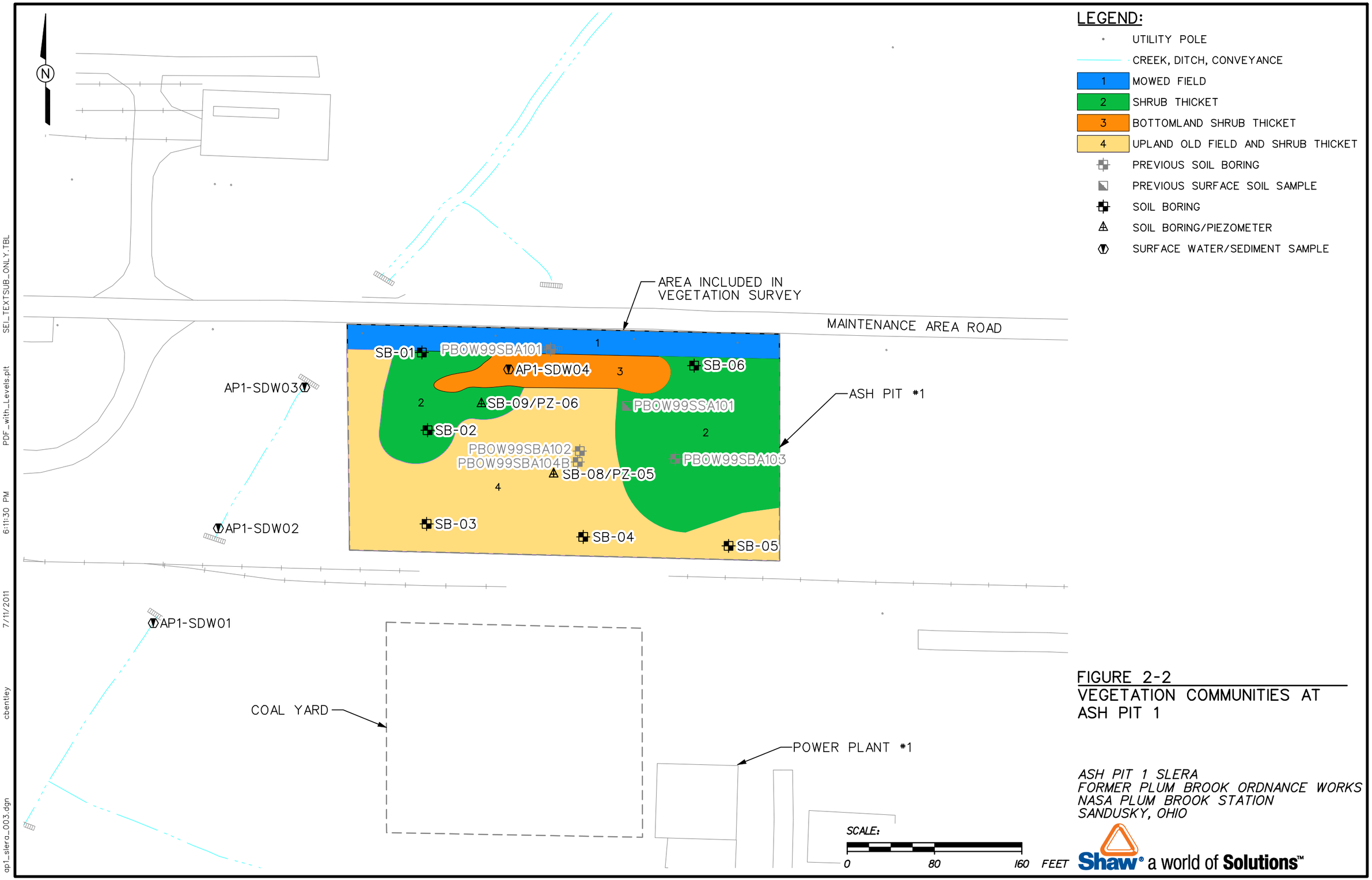
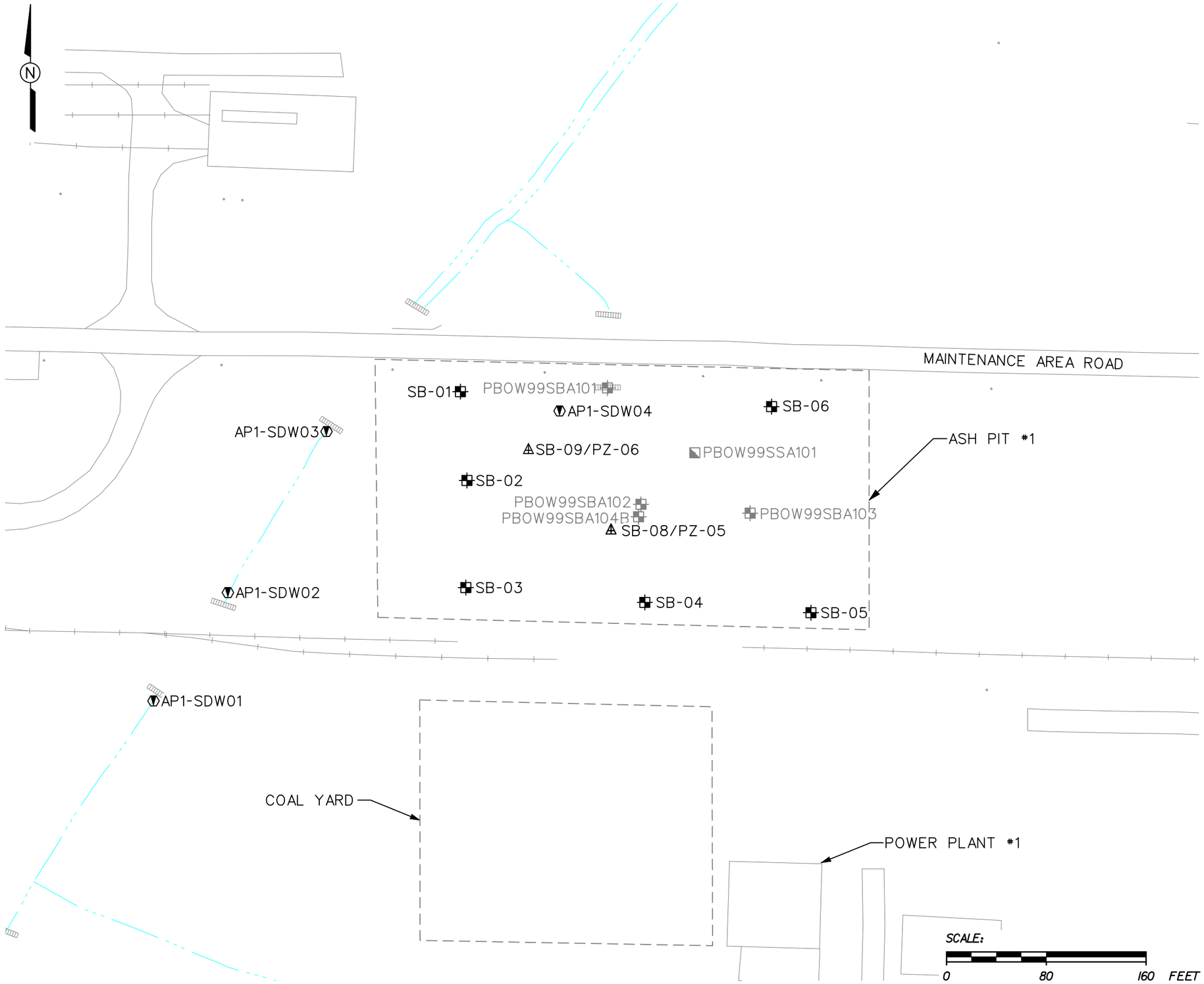


FIGURE 2-2
VEGETATION COMMUNITIES AT ASH PIT 1

ASH PIT 1 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO



LEGEND:

- PREVIOUS SOIL BORING
- PREVIOUS SURFACE SOIL SAMPLE
- SOIL BORING
- SOIL BORING/PIEZOMETER
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

NOTES:

1. NO BORING LABELED SB-07 WAS DRILLED.

FIGURE 2-3
ASH PIT 1 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 1 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

SEL_TEXTSUB_ONLY.TBL
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6:11:56 PM
7/11/2011
cbentley
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Figure 2-4

Simplified Terrestrial Food Web Conceptual Site Model
Ash Pit 1, Plum Brook Ordnance Works
Sandusky, Ohio

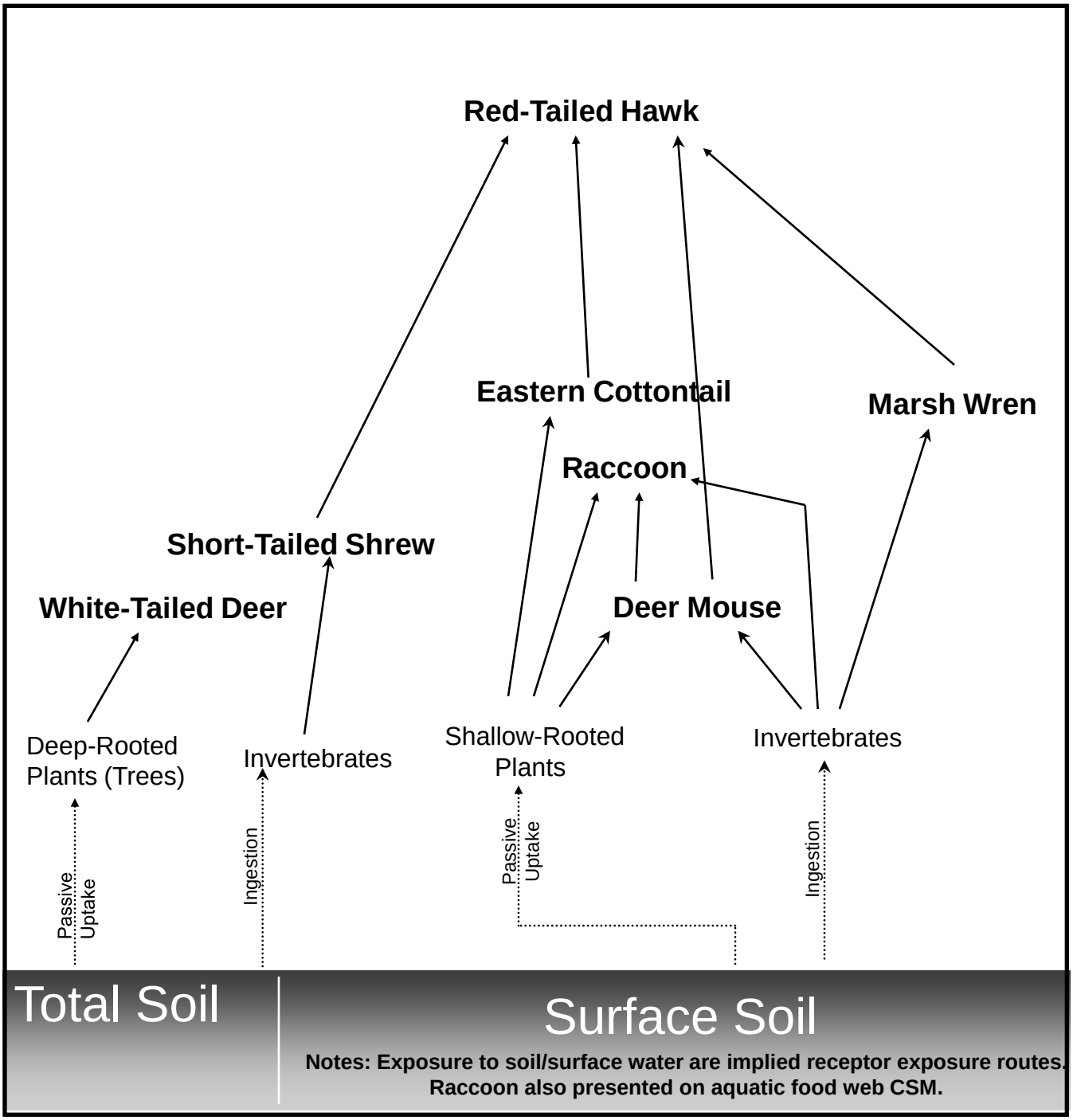
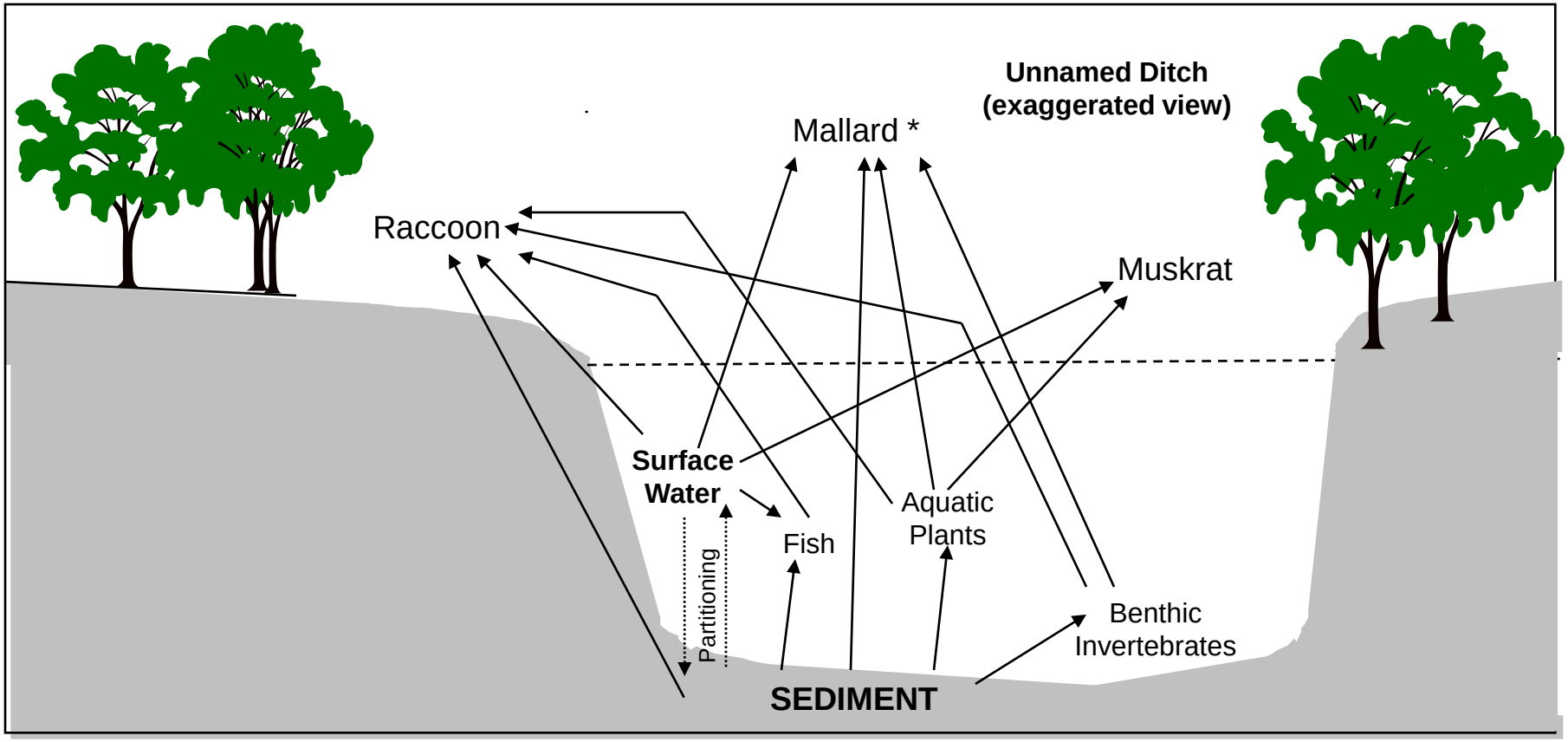


Figure 2-5

Simplified Aquatic Food Web Conceptual Site Model
Ash Pit 1, Plum Brook Ordnance Works
Sandusky, Ohio

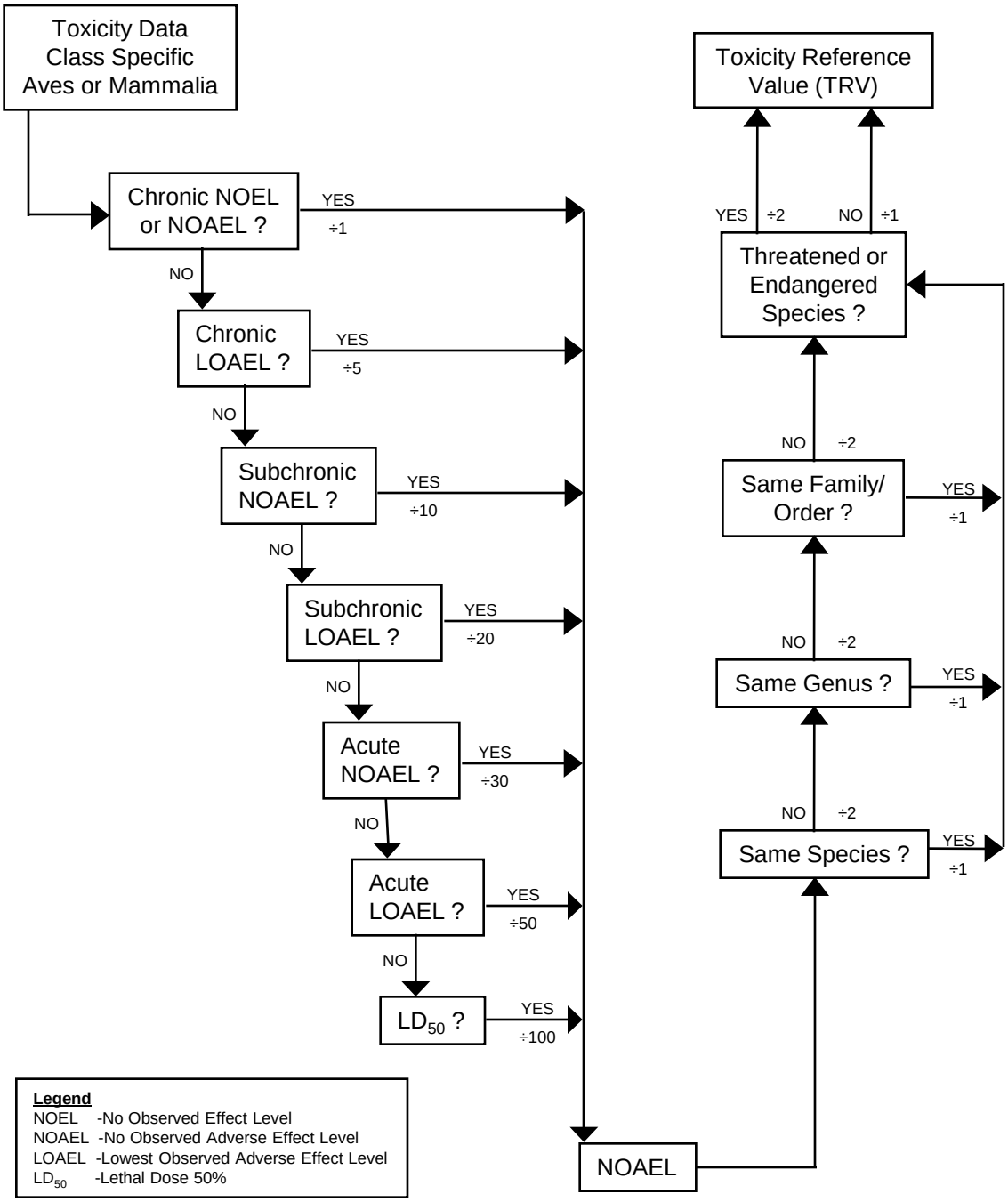


Note: The raccoon is also presented on terrestrial food web CSM.

*** = The mallard is not evaluated in the risk assessment.**

Figure 4-1

Procedural Flow Chart for Deriving Toxicity Reference Values from Class-Specific Toxicity Data Plum Brook Ordnance Works, Sandusky, Ohio



Credit: Adapted from Ford et al. (1992) in *Tri-Service Procedural Guidelines for Ecological Risk Assessments*, 1996

APPENDIX A

VASCULAR PLANT SPECIES DOCUMENTED ON SITE

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
**Acer platanoides*	Norway maple	Occasional		Disturbed woods	1
**Achillea millefolium*	Yarrow	Frequent		Dry fields, roadsides, and about buildings	1,2
**Agropyron repens*	Quack grass	Frequent		Old fields and roadsides	2
**Agrostis gigantea*	Redtop	Common		Moist fields, ditches, and roadsides	1,2
**Alliaria petiolata*	garlic mustard	Frequent		Dry to moist wood lots	1,2
**Andropogon virginicus*	broom-sedge	Occasional, frequent		Dry fields and roadsides	1,2
**Anthoxanthum odoratum*	vernal-grass	Occasional		Dry fields and openings, especially on shale	1
**Arabidopsis thaliana*	mouse-ear cress	Occasional		Road berms and about buildings	1
**Arctium minus*	Burdock	Occasional		Disturbed fields and about buildings	1
**Artemisia ludoviciana var. gnaphaloides*	white sage	Occasional		Grassy roadsides	1
**Berberis thunbergii*	Japanese barberry	Occasional, rare		Woodland borders	1
**Brassica nigra*	black mustard	Occasional		Roadsides	1
**Bromus inermis*	smooth brome	Frequent		Dry to moist fields and roadsides	1,2
**Bromus tectorum*	downy chess	Occasional		Dry openings and roadsides on shale	1
**Campsis radicans*	trumpet-vine	Occasional		Disturbed openings and roadsides	1
**Capsella bursa-pastoris*	shepherd's-purse	Occasional		Roadsides and about buildings	1,2
**Cardamine hirsuta*	bitter-cress	Occasional		Roadsides and about buildings	1
**Carduus nutans*	musk-thistle	Occasional, frequent		Dry fields and roadsides	1
**Cerastium fontanum*	mouse-ear chickweed	Frequent		Road berms and about buildings	1
**Cerastium semidecandrum*	NA	Occasional		Road berms and about buildings	1
**Chaenorrhinum minus*	dwarf snapdragon	Occasional		Road berms and about buildings	1
**Chrysanthemum leucanthemum*	ox-eye daisy	Frequent		Dry to moist fields and roadsides	1
**Cichorium intybus*	Chicory	Occasional		Roadsides	1,3
**Cirsium arvense*	Canada thistle	Common		Disturbed fields and roadsides	1,3
**Cirsium vulgare*	bull thistle	Frequent		Disturbed fields and roadsides	1,2
**Confolvulus arvensis*	field bindweed	Occasional		Disturbed fields and roadsides	1,3
**Convallaria majalis*	lilly-of-the-valley	Rare		Grassy field along Columbus Avenue	1
**Coronilla varia*	crown-vetch	Occasional, common		Grassy fields and roadsides	1,2
**Cyperus esculentus*	yellow nutgrass	Occasional, frequent		Moist, disturbed openings	1
**Dactylis glomerata*	orchard-grass	Occasional		Dry to moist fields and roadsides	1,2
**Daucus carota*	wild carrot	Frequent		Dry fields and roadsides	1
**Dianthus armeria*	Deptford pink	Occasional, rare		Dry openings and roadsides on shale	1
**Dipsacus fullonum*	common teasel	Frequent		Dry, disturbed openings and roadsides	1
**Draba verna*	early whitlow-wort	Occasional		Dry roadsides and about buildings	1
**Eleagnus umbellata*	autumn-olive	Occasional		Roadsides and woodland borders	1,2
**Elytrigia repens*	quack-grass	Frequent		Dry fields and roadsides	1
**Festuca elatior*	tall fescue	Occasional		Roadsides and grassy fields	1
**Festuca obtusa*	Fescue	Common		Old fields	2
**Glecoma hederacea*	ground-ivy	Frequent		Moist openings, roadsides, and about buildings	1,3
**Hieracium piloselloides*	king-devil	Frequent		Dry openings on shale, fields	1
**Hypericum perforatum*	dotted St. John's-wort	Frequent		Disturbed fields and roadsides	1
**Inula helenium*	Elecampane	Rare		Moist roadside along Taft Road	1
**Lamium purpureum*	dead-nettle	Frequent		Disturbed fields, roadsides, and about buildings	1
**Lepidium campestre*	field-cress	Occasional		Roadsides and about buildings	1
**Linaria vulgaris*	butter-and-eggs	Occasional		Roadsides and about buildings	1
**Lonicera maackii*	Amur honeysuckle	Rare		Roadsides and thickets along Columbus Avenue near Scheid Ditch	1
**Lonicera morrowii*	Asiatic honeysuckle	Frequent		Thickets, borders, and roadsides	1
**Lonicera tatarica*	Tatarian honeysuckle	Frequent, common		Thickets, borders, and roadsides	1,2
**Lotus corniculatus*	bird's-foot trefoil	Occasional		Grassy fields and road berms	1
**Matricaria matricarioides*	pineapple-weed	Occasional		Roadsides and about buildings	1
**Medicago lupulina*	Black medic	Occasional		Old fields and disturbed areas	2
**Melilotus alba*	white sweet-clover	Occasional, frequent		Disturbed fields and roadsides	1,3
**Melilotus officinalis*	yellow sweet-clover	Occasional		Disturbed fields and roadsides	1,3
**Najas minor*	Eurasian naiad	Frequent		Artificial ponds	1
**Nepeta cataria*	catnip	Occasional, frequent		Roadsides and weedy openings	1,2
**Oxalis europea*	Sorrel	Common		Old fields and disturbed areas	3
**Pastinaca sativa*	wild parsnip	Occasional		Roadsides	1
**Phleum pratense*	timothy	Frequent		Disturbed fields and roadsides	1
**Plantago lanceolata*	English plantain	Frequent		Disturbed openings and about buildings	1,2

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
**Plantago major*	broad-leaved plantain	Frequent		Road berms and about buildings (1) disturbed areas and old fields (2a)	1
**Poa annua*	early bluegrass	Common		Road berms and about buildings	1
**Poa compressa*	Canada bluegrass	Frequent		Dry openings, especially on shale, and roadsides	1,2
**Polygonum caespitosum*	NA	Rare		Moist, shaded ground in bunker area	1
**Polygonum hydropiper*	water-pepper	Occasional		Margins of ponds	1,3
**Rosa multiflora*	multiflora rose	Occasional		Disturbed openings, borders, and thickets	1
**Rumex acetosella*	red sorrel	Occasional		Dry openings over shale	1
**Rumex crispus*	curly dock	Occasional		Roadsides and about buildings	1,2
**Saponaria officinalis*	soapwort	Frequent, occasional		Dry fields, roadsides, and about buildings	1
**Setaria faberi*	nodding foxtail-grass	Occasional, common		Grassy roadsides in the bunker area	1,3
**Setaria viridis*	green foxtail-grass	Frequent, common		Dry roadsides and about buildings	1
**Solanum caroliniense*	horse-nettle	Occasional, common		Dry openings and roadsides	1,2
**Solanum dulcamara*	bittersweet-nightshade	Occasional		Roadsides, ditches, thickets, and about buildings	1
**Stellaria media*	chickweed	Common		Road berms and about buildings	1
**Taraxacum officinalis*	dandelion	Frequent, occasional		Roadsides and about buildings	1,2
**Tragopogon pratensis*	Yellow goatsbeard	Rare		Old fields	3
**Trifolium pratense*	red clover	Occasional		Grassy fields and roadsides	1,2
**Trifolium repens*	common white clover	Common		Grassy roadsides and about buildings	1,3
**Verbascum blattaria*	moth-mullein	Occasional, rare		Disturbed fields and roadsides	1,3
**Verbascum thapsus*	common mullein	Frequent, occasional		Disturbed fields	1
**Veronica officinalis*	common speedwell	Occasional		Dry openings on shale	1
**Veronica serpyllifolia*	thyme-leaved speedwell	Occasional		Roadsides and about buildings	1
Acalypha rhomboidea	Three-seeded mercury	NA		NA	3
Acer negundo	box-elder maple	Frequent		Stream banks, ditches, and moist woods	1,2
Acer rubrum	red maple	Common		Dry to moist woods	1
Acer saccharinum	Silver maple	Rare		Dry to moist woods	3
Acer saccharum	Sugar maple	Occasional		Dry to moist woods	3
Acorus calamus	Sweet flag	Rare		Wet ditches	3
Agalinis purpurea	purple false-foxglove	Frequent		Moist openings and ditches	1
Agrimonia parviflora	southern agrimony	Frequent		Moist fields and ditches	1,2
Agrostis hyemalis	Ticklegrass	Occasional		Dry, grassy fields and shaley openings	1
Agrostis perennans	autumn bent-grass	Frequent		Dry woods and borders on shale	1
Ailanthus altissima	tree of heaven	NA		NA	3
Alisma plantago-aquatica	Water plantain	NA		NA	3
Alisma subcordatum	water-plantain	Occasional		Ponds and ditches	1,3
Allium canadense	Field garlic	NA		NA	3
Allium canadense	Wild garlic	Occasional		Successional woods	3
Ambrosia artemisiifolia	common ragweed	Frequent, occasional		Dry fields and roadsides	1,2
Ambrosia trifida	giant ragweed	Occasional		Dry fields and roadsides	1
Andropogon gerardii	big bluestem	Frequent, 0ccasional		Dry to moist fields and roadsides	1,3
Anemone virginiana	Thimbleweed	NA		NA	2
Antennaria parlinii	pussy-toes	Occasional		Dry fields and openings, especially on shale	1
Apios americana	Groundnut	NA		NA	2
Apocynum cannabinum	Dogbane	Frequent		Dry to moist fields and roadsides	1,2
Arctium minus	lesser burdock	NA		NA	3
Arenaria lateriflora	grove sandwort	Rare	T	Woods along Ransom Brook north of reactor	1
Arisaema triphyllum	Jack-in-the-pulpit	Rare		Moist to dry woods	3
Aristida dichotoma	Churchmouse grass	Occasional		Dry fields and openings	1
Aristida longespica	slimspike triple-awned grass	Common		Dry fields and openings	1
Aristida oligantha	prairie triple-awned grass	Occasional		Dry openings and roadsides	1
Asclepias hirtella	prairie milkweed	Common		Dry to moist openings	1
Asclepias incarnata	Swamp milkweed	Occasional		Wet ditches	3
Asclepias sullivantii	Sullivant's milkweed	Rare		Moist field along Patrol Road south of Scheid Road	1
Asclepias syriaca	common milkweed	Frequent		Dry to moist fields and roadsides	1,2
Asclepias tuberosa	butterfly-weed	Occasional		Dry openings and roadsides	1
Asparagus officinalis	asparagus	NA		NA	3
Aster ericoides	white heath aster	Rare, frequent		Grassy strip along Patrol Road southeast of Taft Road	1
Aster laevis	smooth aster	Rare		White oak grove on Taft Road	1
Aster lateriflorus	calico aster	Common, frequent		Moist woods and thickets	1,2
Aster novae-angliae	New England aster	Occasional		Dry fields and roadsides	1,2

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Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Aster pilosus	common white aster	Common		Dry fields, roadsides, and about buildings	1
Aster sagittifolius	Arrow-leaved aster	Frequent		Woods and fields	3
Aster umbellatus	flat-top aster	Frequent, rare		Dry to moist fields and roadsides	1
Baptisia lactea	prairie false indigo	Occasional	P	Dry openings in bunker area	1
Baptisia tinctoria	yellow false indigo	Occasional		Dry openings in bunker area	1
Berberis thunbergii	Barberry	NA		NA	3
Bidens coronata	northern tickseed-sunflower	Common		Moist fields and ditches	1
Bidens frondosa	Beggar ticks	Rare		Ditches	2
Boehmeria cylindrica	false nettle	Occasional		Ponds and ditches	1,2
Botrychium sp.	Grape fern	NA		NA	3
Botrychium virginianum	Rattlesnake fern	Occasional		Successional woods	3
Brassica nigra	mustard	NA		NA	3
Bromus pubescens	Brome	Occasional		Dry fields	3
Cacalia atriplicifolia	pale Indian-plantain	Occasional		Dry fields and roadsides; woods	1
Calamagrostis canadensis	blue-joint	Occasional		Moist fields and ditches	1
Callitriche heterophylla	water-starwort	Occasional		Pond margins and seasonally-moist depressions	1
Calystegia sepium	Hedge bindweed	Occasional		Fields	3
Carex aggregata	Glomerate sedge	NA		NA	3
Carex aggregata	sedge	Occasional		Moist woods	2
Carex alata	broad-winged sedge	Rare	P	Grassy field along Patrol Road south of Scheid Road, also in grassy strip between Patrol Road and artificial pond southeast of Taft Road	1
Carex albursina	White bear sedge	NA		NA	2
Carex amphibola	Eastern narrowleaf sedge	Occasional		Thickets and woods borders	2
Carex annectens var. annectens	NA	Occasional		Moist, grassy fields	1
Carex annectens var. xanthocarpa	yellow-fruited sedge	Occasional		Moist, grassy fields	1
Carex blanda	eastern woodland sedge	Frequent		Moist woods	1,2
Carex bromoides	Brome-like sedge	NA		NA	3
Carex cephaloidea	thin-leaf sedge	Rare	E	Woods border along Pentolite Road west of reactor	1
Carex complanata var. hirsutella	NA	Frequent		Dry fields and woods borders	1
Carex conoidea	field sedge	Rare	T	Grassy depression along Taft Road south of North Magazine Road	1
Carex cristatella	NA	Occasional		Moist fields and ditches	1
Carex festucacea	fescue sedge	Occasional		Moist, grassy fields	1
Carex frankii	Frank's sedge	NA		NA	2
Carex gracillima	NA	Occasional		Moist woods	1
Carex granularis	meadow sedge	Common		Moist, grassy fields and ditches	2
Carex hirtifolia	NA	Rare		Disturbed oak woods along angling road	1
Carex hystericina	Bottlebrush sedge	Rare		Moist depression along Taft Road	1
Carex pensylvanica	Pennsylvania sedge	Common		Dry woods	1
Carex radiata	Eastern star sedge	NA		NA	3
Carex rosea	NA	Frequent		Dry to moist woods	1
Carex scoparia	NA	Frequent		Moist, grassy fields	1
Carex sp.	sedges	NA		NA	3
Carex sparganoides	Bur-reed sedge	NA		NA	2
Carex stipata	NA	Frequent		Moist fields and ditches	1
Carex stricta	tussock sedge	Occasional		Moist fields and ditches	1
Carex swanii	Swan's sedge	Occasional		Dry, grassy fields	1
Carex tribuloides	Blunt broom sedge	Occasional		Moist, grassy fields and ditches	1
Carex umbellata	NA	Occasional		Well-drained, grassy fields on sandy soil	1
Carex vulpinoidea	fox sedge	Common		Moist fields, ditches, and about ponds	1
Carya cordiformis	Bitternut hickory	NA		NA	3
Carya ovata	shagbark hickory	Rare		Sandy soil along fence at far southeast boundary	1,3
Catalpa speciosa	Catalpa	NA		NA	3
Celastrus orbiculatus	Bittersweet	Occasional		Thickets and woods borders	3
Celtis occidentalis	Hackberry	Occasional		dry to moist woods and borders	1
Cephalanthus occidentalis	Buttonbush	Occasional		Moist depressions and ditches	1,3
Cerastium arvense	field chickweed	Rare		White oak grove along Taft Road	1
Chamaecrista fasciculata	partridge-pea	Occasional		Dry openings on shale	1
Chenopodium album	lamb's quarters	NA			2

Appendix A

Vascular Plant Species Documented On Site
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Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Cinna arundinacea	Wood reed grass	Occasional		Woods	3
Circaea lutetiana	Southern broad-leaved enchanter's nightshade	Frequent		Woods	2
Cirsium arvense	creeping thistle	NA		NA	2
Cirsium discolor	prairie thistle	Frequent, occasional		Grassy fields and roadsides	1
Clematis virginiana	Virgin's bower	NA		NA	2
Clinopodium vulgaris	wild basil	Occasional		Dry roadsides and openings	1
Conyza canadensis	Horseweed	Frequent		Dry fields and roadsides	1,3
Cornus amomum	swamp dogwood	Frequent, occasional		Moist fields and thickets	1
Cornus drummondii	rough-leaved dogwood	Frequent		Moist borders, thickets, and roadsides	1.2
Cornus florida	flowering dogwood	Occasional		Woodland borders and roadsides	1
Cornus racemosa	gray dogwood	Frequent		Dry fields and roadsides	1,2
Crataegus mollis	downy hawthorn	Frequent		Thickets and woodland borders	1
Crataegus punctata	dotted hawthorn	Frequent		Thickets and woodland borders	1
Cryptotaenia canadensis	honewort	Occasional, rare		Dry to moist woods	1
Cuscuta gronovii	dodder	Frequent		Moist fields and ditches	1
Cyperus esculentus	Chufa	NA		NA	3
Cyperus flavescens	Umbrella sedge	occasional		Old fields and waste places	3
Cyperus strigosus	umbrella-sedge	Frequent		Moist openings, ponds, and ditches	1,3
Danthonia spicata	poverty-grass	Occasional		Dry openings over shale	1
Datura stramonium	jimson-weed	Occasional		Disturbed openings and roadsides	1
Daucus carota	Queen Anne's lace	NA		NA	2
Desmodium canescens	Tick trefoil	Occasional		Fields	3
Dichanthelium dichotomum	cypress panic grass	NA		NA	3
Digitaria cognatum (Leptoloma cognatum)	NA	Occasional		Old fields	3
Digitaria ischaemum	smooth crabgrass	NA		NA	3
Diodia teres	buttonweed	Occasional		Dry openings over shale	1
Dioscorea villosa	Yam root	NA		NA	3
Dipsacus sylvestris	teasel	NA			2
Dryopteris carthusiana	spinulose woodfern	Frequent		Moist woods and shaded borders	1
Eleocharis acicularis	needle spikerush	Frequent		Margins of artificial pond	1
Eleocharis erythropoda	red-footed spikerush	Occasional		Moist openings and ditches	1
Eleocharis obtusa	NA	Common		Moist openings and ditches	1
Eleocharis smallii	Small's spikerush	Frequent		Margins of artificial pond	1
Eleocharis sp.	Spike rush				2
Eleocharis tenuis	NA	Frequent		Moist openings and ditches	1
Elymus sp.	Rye grass	NA		NA	3
Elymus virginica	Wild rye	Occasional		Moist to dry woods	3
Epilobium coloratum	purple-leaved willow herb	NA		NA	2
Equisetum arvense	horsetail	Frequent		Moist openings, roadsides, and ditches	1,2
Equisetum hyemale	scouring-rush	Occasional		Moist roadsides and ditches	1,2
Eragrostis frankii	NA	Occasional		Moist openings and ditches	1
Eragrostis spectabilis	showy lovegrass	Occasional		Dry to moist fields	1
Erechtites hieracifolia	Pilewort	Common		Disturbed woods, borders, and roadsides	1
Erigeron anuus	Fleabane	NA		NA	2
Erigeron philadelphicus	Philadelphia fleabane	Frequent, occasional		Roadsides and borders	1
Erigeron strigosus	smooth fleabane	Occasional		Dry openings and roadsides	1
Eupatorium perfoliatum	Boneset	Occasional, frequent		Moist fields, ponds, and ditches	1
Eupatorium purpureum	purple joe-pye-weed	Occasional		Borders of moist woods, fields	1,3
Eupatorium rugosum	White snake root	Common		Woods and fields	2
Eupatorium sessilifolium	Upland boneset				2
Euphorbia corollata	Flowering spurge	Occasional		Dry fields	1
Euphorbia maculata	Prostrate spurge	Occasional		Dry openings, road berms, and about buildings	1,2
Euphorbia supina	Milk purslane	NA		NA	3
Euthamia graminifolia	grass-leaved goldenrod	Common		Dry to moist fields and roadsides	1,2
Fragaria virginiana	wild strawberry	Frequent		Dry to moist fields and roadsides	1
Fraxinus americana	white ash	Frequent		Dry to moist woods and borders	1
Fraxinus pensylvanica	green ash	Frequent, common		Moist woods and stream banks	1,2
Galine aparine	Cleavers	Occasional		Moist woods and borders	1,2
Galium asperellum	Rough bedstraw	NA		NA	2
Galium circaezans	wild licorice	Rare		Dry woods	1

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
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Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Galium tinctorium	Southern bedstraw	Rare		Moist depression along Taft Road	1
Gentianopsis crinita	Fringed gentian	Occasional	P	Old fields along ditch banks, small groups and scattered individuals in northeast portion of TNT area A	3
Geranium maculatum	Wild geranium	Occasional		Successional woods	3
Gerardia tenuifolia	Slender gerardia	Frequent		Disturbed fields	3
Geum laciniatum	Rough avens				2
Geum vernum	spring avens	Occasional		Moist woods and borders	1
Geum virginianum	white avens	Occasional		Woods borders and roadsides	1
Gleditsia triacanthos	honey-locust	Occasional, rare		Dry to moist woods and borders	1
Glyceria striata	manna-grass	Occasional		Moist woods and about ponds	1,3
Gnaphalium obtusifolium	Cudweed	Frequent, occasional		Dry openings on shale, fields	1,2
Gratiola virginiana	round-fruited hedge-hyssop	Rare	P	ca 20 plants; moist, shaded ground by pond west of Snake Road	1
Hackelia virginiana	Virginia stickseed	Rare		Woods	2
Hedyotis caerula	Bluets	Occasional		Dry openings and roadsides on shale	1
Helenium autumnale	Sneezeweed	Occasional		Disturbed fields	3
Helenium flexuosum	Southern sneezeweed	Occasional		Moist, open ground and ditches	1
Helianthus mollis	ashy sunflower	Rare	T	ca 200 plants in grassy field south and southwest of junction of Fox and Patrol Roads; the exact number of individuals in this population is uncertain since excessive browsing by deer has reduced the plants to leafy tufts.	1
Helianthus tuberosus	Jerusalem artichoke	Occasional		Old fields	3
Hemerocallus fulva	Daylily	NA		NA	3
Hesperis matronalis	Dame's rocket	NA		NA	3
Hibiscus moscheutos	rose-mallow	Rare		Moist swale along Ransom Road	1
Hypericum gentianoides	orange-grass	Frequent		Dry openings	1
Hypericum gymnanthum	least St. John's-wort	Rare	E	ca 50 plants; moist, open ground along Patrol Road south of Fox Road	1
Hypericum majus	tall St. John's-wort	Rare	P	Moist, shaded ground by pond west of Snake Road	1
Hypericum mutilum	little St. John's-wort	Frequent		Moist openings, ponds, and ditches	1
Hypericum perforatum	common St. John's wort	NA			3
Hypericum punctatum	St. Johns wort	Rare		Fields	3
Hypoxis hirsuta	yellow-eyed-grass	Occasional		Grassy fields	1
Hystrix patula	Bottlebrush grass	Occasional		Woods	3
Impatiens capensis	Jewelweed	NA		NA	3
Ipomoea pandurata	wild sweet-potato	Occasional		Dry openings over shale	1
Ipomoea purpurea	common morning glory	NA		NA	3
Iris versicolor	Northern blue flag	Occasional		Moist woods and ditches	1
Isanthus brachiatus	false pennyroyal	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Juglans nigra	black walnut	Rare		A few young trees at edge of grassy field southwest of junction of Fox and Patrol Roads, woods (2b)	1
Juncus acuminatus	NA	Common		Moist openings and ditches	1
Juncus biflorus	NA	Occasional		Moist openings and ditches	1
Juncus brachycarpus	NA	Occasional		Moist openings	1
Juncus canadensis	Canada rush	Frequent		Moist openings	1
Juncus dudleyi	Dudley's rush	Frequent		Moist openings	1
Juncus effusus	Common rush	Frequent		Moist openings, ponds, and ditches	1
Juncus marginatus	NA	Occasional		Moist openings	1
Juncus nodosus	rush	Occasional		Old fields and ditches	3
Juncus tenuis	path rush	Frequent, occasional		Dry openings, road berms, and about buildings	1
Juncus torreyi	Torrey's rush	Occasional		Moist fields	2
Juniperus virginiana	Red cedar	NA		NA	3
Laportea Canadensis	Wood nettle	NA		NA	3
*Lathyrus latifolius**	Everlasting pea	Occasional		Old fields	3
Leersia oryzoides	rice cutgrass	Occasional		Moist fields and ditches	1,2
Leersia virginica	White grass	NA		NA	2
Lemna minor	Lesser duckweed	Occasional		Ponds and standing water	1,2
Lepidium campestre	field peppergrass	NA		NA	3
Lepidium virginicum	poor man's pepper	Frequent		Roadsides, disturbed openings, and about buildings	1

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Vascular Plant Species Documented On Site
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Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Leptoloma cognatum	fall witch grass	NA		NA	3
Lespedeza capitata	bush-clover	Occasional		Dry fields	1
Leucospora multifida	NA	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Liatris scariosa var. novae-angliae	northern blazing-star	Rare		Dry ground along Patrol Road at Olemacher Ditch	1
Liatris spicata	spiked blazing-star	Occasional		Moist openings	1
Lindernia dubia	false pimpernel	Occasional		Moist openings, ditches, and pond margins	1
Linum medium	wild flax	Frequent		Dry to moist openings	1
Linum virginianum	Virginia flax	Rare		About pond in northern bunker area	1
Lobelia siphilitica	Great lobelia	Frequent		Moist fields	3
Lonicera japonica	Japanese honeysuckle	Occasional		Fields and disturbed areas	3
Ludwigia alternifolia	rattlebox	Occasional		Ponds and ditches	1
Ludwigia palustris	water-purslane	Frequent, occasional		Ponds and ditches	1
Ludwigia polycarpa	NA	Rare		Moist, shaded ground by pond on Snake Road	1
Lycopus americana	American bugleweed				2
Lycopus americanus	American water-horehound	Frequent		Ponds and ditches	1,3
Lycopus uniflorus	northern water-horehound	Frequent		Moist woods and shaded borders	1
Lycopus virginicus	Virginia bugleweed				2
Lysimachia terrestris	swamp loosestrife	Occasional		Moist openings	1,3
Lythrum alatum	prairie loosestrife	Occasional		Moist openings	1
Lythrum salicaria	Purple loosestrife				2
Maclura pomifera	osage-orange	Occasional		Disturbed woods and borders	1,3
Melilotus sp.	Sweet clover				2
Mentha piperita	peppermint	NA		NA	3
Mentha spicata	Spearmint	Occasional		Moist fields	3
Mimulus ringens	monkey-flower	Occasional, rare		Moist openings and ditches	1
Monarda fistulosa	bergamont	Occasional		Grassy fields	1
Monarda sp.	bee balm	NA		NA	2
Morus alba	Mulberry	Occasional		Fields and thickets	2
Muhlenbergia frondosa	muhly grass	Frequent		Moist fields and ditches	1
Myrica pensylvanica	Bayberry	Rare	E	One individual in old field in northern portion of area	3
Najas flexilis	northern naiad	Occasional		Artificial ponds	1
Nyssa sylvatica	blackgum	Occasional		Thickets and woods borders	1
Oenothera biennis	evening-primrose	Frequent		Dry fields, roadsides, and about buildings	1
Oenothera tetragona	northern sundrops	Frequent		Moist, grassy fields	1
Onoclea sensibilis	Sensitive fern	frequent		Wet areas	2
Osmunda cinnamomea	cinnamon fern	Rare		Depressions in moist woods along angling road	1
Osmunda regalis	royal fern	Occasional		Depressions in moist woods	1
Oxalis stricta	sorrel	NA		NA	3
Oxalis violacea	purple wood-sorrel	Occasional		Drier oak woods and borders on shale	1
Panicum capillare	witchgrass	NA		NA	3
Panicum clandestinum	deer tongue grass	NA		NA	2
Panicum dichotomiflorum	Panic grass	Frequent		Fields	3
Panicum flexile	wiry witch-grass	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Panicum lanuginosum	hairy panic-grass	common		Dry, grassy fields and roadsides	1
Panicum oligosanthes	sand panic-grass	Occasional		Dry, grassy fields	1
Panicum rigidulum	stiff panic-grass	Frequent		Moist openings and ditches	1
Panicum virgatum	switch-grass	Occasional		Dry fields	1,2
Parietaria pensylvanica	pellitory	Occasional		Dry, disturbed wood lots and borders	1
Paronychia fastigata	forked chickweed	Occasional		Dry woods and borders on shale	1
Parthenocissus quinquefolia	Virginia-creeper	Occasional		Dry to moist woods borders and thickets	1,2
Parthenocissus vitacea	grape-woodbine	Rare		Dry opening north of Center Magazine Road	1
Penstemon digitalis	tall white beard-tongue	Frequent		Grassy fields and roadsides	1,2
Phalaris arundinacea	reed canary-grass	Common		Moist fields and ditches	1,2
Phragmites australis	reed-grass	Occasional, rare		Moist openings and ditches	1
Phryma leptostachya	lopseed	Rare		Edge of woods along Scheid Ditch near Columbus Avenue; successional woods	1
Phytolacca americana	pokeberry	Occasional, rare		Moist woods and borders	1,2
Pilea pumila	clearweed	NA		NA	3
Plantago major	common plantain	NA		NA	2

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Platanthera lacera	ragged fringe-orchid	Rare		Ditch along south Patrol Road	1
Platanus occidentalis	sycamore	Occasional, frequent		Moist woods and stream banks, fields and waste areas	1,3
Poa pratensis	Kentucky bluegrass	NA		NA	2
Podophyllum peltatum	may-apple	Occasional		Dry to moist woods	1,2
Polygala sanguinea	blood milkwort	Frequent		Moist openings	1
Polygala verticillata	whorled milkwort	Occasional		Moist openings	1
Polygonum hydropiper	Smartweed	NA		NA	3
Polygonum hydropiperoides	false water-pepper	Occasional		Wet ditches and pond margins	1
Polygonum pennsylvanicum	Pennsylvania smartweed	NA		NA	2
Polygonum sagittatum	arrow-leaved tearthumb	Occasional		Moist thickets and ditches	1
Polygonum scandens	climbing false buckwheat	Occasional		Thickets and roadsides	1
Polygonum sp.	Smartweed	NA		NA	3
Polygonum virginianum	Virginia knotweed	Common		Moist to dry woods	2
Populus deltoides	cottonwood	Frequent, common		Moist woods, borders, and stream banks	1
Potamogeton diversifolius	snailseed pondweed	Frequent		Artificial ponds	1
Potamogeton foliosus	leafy pondweed	Occasional		Artificial ponds	1
Potamogeton nodosus	longleaf pondweed	Occasional		Artificial ponds	1
Potamogeton pectinatus	Sago pondweed	NA		NA	3
Potentilla simplex	cinquefoil	Frequent		Dry openings and roadsides on shale	1
Prunella vulgaris	self-heal	Occasional, frequent		Roadsides and about buildings	1,2
Prunus americana	wild plum	Occasional		Thickets and roadsides	1
Prunus serotina	wild black cherry	Frequent, common		Dry to moist woods and borders	1
Pycnanthemum tenuifolium	narrow-leaved mountain-mint	Frequent, common		Moist openings, especially on shale, old fields	1,2
Pycnanthemum virginianum	Virginia mountain-mint	Occasional		Moist openings and ditches	1
Pyrus coronaria	crab-apple	Frequent		Thickets and borders	1,3
Quercus alba	white oak	Occasional		Dry woods and sandy ridges; a small grove on Taft Road has an unusually pure stand of this species	1
Quercus bicolor	swamp white oak	Frequent		Moist woodlands	1
Quercus imbricaria	shingle oak	Frequent, occasional		Moist to dry woodlands	1,3
Quercus macrocarpa	bur oak	Rare		ca 5 trees on sandy ridge in bunker area south of North Magazine Road; a few trees in area 2a	1
Quercus palustris	pin oak	Common, frequent		Moist woods	1,2
Ranunculus acris	Field buttercup	NA		NA	3
Ranunculus sceleratus	cursed crowfoot	NA		NA	2
Ratibida pinnata	green-headed coneflower	Occasional, frequent		Roadsides and dry fields	1
Rhexia virginica	Virginia meadow-beauty	Occasional	P	Moist openings and pond margins, south of North Magazine Road and along the angling road	1
Ribes americanum	American currant	NA		NA	3
Ribes cynosbati	Gooseberry	Rare		Woods	3
Riccia sp.	liverwort	NA		NA	3
Robinia pseudoacacia	Black locust	Rare		Old fields and thickets	3
Rosa carolina	pasture rose	Occasional		Dry fields	1
Rosa setigera	prairie rose	Rare		Grassy roadside and thickets along Patrol Road at Olemacher Ditch	1,2
Rotala ramosior	toothcup	Occasional		Moist openings and about ponds	1
Rubus allegheniensis	blackberry	Common		Woods, fields, and borders	2
Rubus flagellaris	dewberry	Frequent, common		Dry openings and roadsides on shale, old fields	1,2
Rubus occidentalis	Black raspberry	common		Dry woods, and borders	2
Rudbeckia hirta	black-eyed susan	Frequent		Dry fields and roadsides	1
Rumex acetosella	sheep sorrel	NA		NA	2
Rumex verticillatus	Swamp dock	Rare		Ditches	3
Sagittaria latifolia	broad-leaved arrowhead	Occasional		Ponds and ditches	1
Salix amygdaloides	peachleaf willow	Occasional		Ditches and about ponds	1
Salix discolor	pussy willow	Occasional		Moist openings, ponds, and ditches	1,2
Salix exigua	sandbar willow	Frequent		Moist openings, stream banks, and ditches	1,3
Salix nigra	black willow	Common		Moist woods, stream banks, and ditches	1
Salix sp.	Willow				2
Sambucus canadensis	elder-berry	Frequent, occasional		Moist openings, stream banks, and ditches	1,2
Sassafras albidum	sassafras	Occasional		Dry woods and borders	1
Schizachyrium scoparium	little bluestem	Frequent		Dry fields and roadsides	1
Scirpus acutus	hardstem bulrush	Rare		Moist depression west of Taft Road	1
Scirpus americanus	Three square	rare		Ditches	3

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Scirpus atrovirens	dark green bulrush	Common, occasional		Moist openings, roadsides, and ditches	1,2
Scirpus cyperinus	woolgrass	Occasional		About artificial ponds	1,2
Scirpus fluviatilis	river bulrush	Rare		Moist depression west of Taft Road	1
Scirpus pendulus	NA	Occasional		Moist openings	1
Scirpus polyphyllus	Leafy bulrush				2
Scirpus validus	softstem bulrush	Occasional		Moist openings, ponds, and ditches	1
Scleria triglomerata	tall nut-rush	Rare	P	Moist swale in northern bunker area	1
Scutellaria lateriflora	mad-dog skullcap	Occasional		Moist depressions and ditches	1
Senecio aureus	golden ragwort	Occasional		Moist woods borders	1
Setaria faberi	foxtail	NA		NA	3
Setaria glauca	Yellow foxtail-grass	NA		NA	2
Silphium terebinthinaceum	prairie-dock	Rare		Dry openings at crossing of Patrol Road and Olemacher Ditch	1
Sisyrinchium albidum	prairie blue-eyed-grass	Frequent		Grassy fields	1
Sisyrinchium angustifolium	common blue-eyed-grass	Frequent		Grassy fields	1
Solanum nigrum	Black nightshade	Occasional		Fields and waste areas	3
Solidago canadensis	Canada goldenrod	Common		Grassy fields	1,2
Solidago juncea	early goldenrod	Frequent		Dry to moist fields and roadsides	1
Solidago nemoralis	gray goldenrod	Common		Dry fields and roadsides	1
Solidago riddellii	Riddell's goldenrod	Rare		Moist opening over limestone, west of Snake Road and south of North Magazine Road	1
Sparganium eurycarpum	giant bur-reed	Rare		Wet ditch along Ransom Road	1
Spartina pectinata	prairie cord-grass	Frequent, occasional		Moist depressions, fields, and ditches	1
Spenopholis intermedia	slender wedgescale	NA		NA	3
Spiranthes ochroleuca	creamy ladies'-tresses	Occasional, rare		Ditches and moist openings	1
Sporobolus asper	tall dropseed	Rare		A single stand in dry opening along angling road	1
Sporobolus neglectus	NA	Frequent		Dry openings and road berms	1
Stachys tenuifolia	Hedge nettle	Occasional		Fields	3
Stellaria longifolia	long-leaved stitchwort	Occasional		Moist, grassy fields	1
Symphoricarpos orbiculatus	coralberry	Occasional		Thickets, woods borders, and roadsides	1
Teucrium canadense	American germander	Occasional		Moist openings	1,2
Thelypteris palustris	marsh fern	Occasional, frequent		Moist depressions and roadsides	1
Toxicodendron radicans	Poison ivy	Frequent		Upland and facultative woods, old fields	2
Tradescantia ohioensis	Ohio spiderwort	Occasional		Old fields	2
Triadenum virgnianum	pink St. John's-wort	Rare		Moist swale in northern bunker area	1
Tridens flavus	purpletop	Occasional		Moist fields and roadsides	1
Trifolium hybridum	Alsike clover	Occasional		Fields	3
Triosteum perfoliatum	Wild coffee	Rare		Fields	3
Tussilago farfara	coltsfoot	NA		NA	3
Typha angustifolia	Narrow-leaved cattail	frequent		Ditches	2
Typha latifolia	broad-leaved cattail	Frequent		Moist openings, ponds, and ditches	1,2
Ulmus americana	American elm	Occasional		Moist woods and stream banks	1
Ulmus rubra	slippery elm	Occasional		Moist woods and stream banks	1
Urtica dioica var. procera	American stinging nettle	Occasional, common		Moist fields and openings	1
Urtica dioicia	stinging nettle	NA		NA	2
Verbascum thapsus	woolly mullein	NA		NA	2
Verbena hastata	purple vervain	Frequent		Moist fields, stream banks, and ditches	1,2
Verbena simplex	prairie vervain	Rare		A single stand in dry opening along angling road	1
Verbena stricta	Vervain	Occasional		Fields	3
Verbena urticifolia	white vervain	Occasional, frequent		Moist woods borders and roadsides	1,2
Verbesina alternifolia	wingstem	Frequent, occasional		Moist woods borders, stream banks, and ditches	1
Vernonia gigantea	tall ironweed	Occasional, frequent		Dry to moist fields	1
Viburnum lentago	nannyberry	Frequent		Moist thickets and borders	1
Vicia americana	American vetch	Rare		Old field	3
Viola canadensis	Canada violet	NA		NA	3
Viola cucullata	violet	NA		NA	3
Viola lanceolata	lance-leaved violet	Frequent	P	Ditches and moist openings	1
Viola sagittata	arrow-leaved violet	Frequent		Grassy fields and dry banks	1
Viola sororia	common blue violet	Common, occasional		Grassy fields, roadsides, and about buildings	1
Vitis aestivalis	summer grape	NA		NA	3
Vitis riparia	riverbank grape	Frequent		Woods borders, thickets, and stream banks	1,2
Vitis vulpina	fox grape	Occasional		Woods borders and thickets	1

Appendix A

Vascular Plant Species Documented On Site
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
Wolffia columbiana	Columbian water meal	NA		NA	3
Xanthium strumarium	Cockle bur	NA		NA	2
Zanichellia palustris	horned pondweed	Rare		Artificial pond west of Snake Road	1
Zizia aurea	Golden alexanders	Rare		Old fields	3

[(a)] Common - Species which occur in large numbers throughout.
Frequent - Species regularly encountered, but occurring in lesser numbers than common ones.
Occasional - Species found in several places, but never present in large numbers.
Rare - Species found in few places and in low numbers.

[(b)] T - Ohio Threatened Species. P = Ohio Potentially Threatened Species. E = Ohio Endangered Species.

[(c)] 1 - Biological Inventory of Plum Brook Station (Ohio Department of Natural Resources, 1994).
2 - Observed at Ash Pit 1 during site reconnaissance October, 2008 and/or June, 2009.
3 - Observed during a site reconnaissance at another Plum Brook site.

NA – Not available

* Non-native species.

APPENDIX B

ECOLOGICAL SCREENING VALUES

Table B-1

Ecological Screening Values for Soil
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)	Reference
Inorganic Analytes								
Aluminum	7429-90-5	pH Dependent	NSV	NSV	NSV	50	pH Dependent	a
Antimony	7440-36-0	0.27	5	0.142	NSV	5	0.27	a
Arsenic	7440-38-2	18	9.9	5.7	60	10	18	a
Barium	7440-39-3	330	283	1.04	NSV	500	330	a
Beryllium	7440-41-7	21	10	1.06	NSV	10	21	a
Cadmium	7440-43-9	0.36	4	0.00222	20	4	0.36	a
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV	Nutrient	
Chromium	7440-47-3	26	0.4	0.4	0.4	1	26	a
Chromium, hexavalent	18540-29-9	81	NSV	NSV	NSV	NSV	81	a
Cobalt	7440-48-4	13	20	0.14	NSV	20	13	a
Copper	7440-50-8	28	60	5.4	50	100	28	a
Iron	7439-89-6	pH Dependent	NSV	NSV	NSV	NSV	pH Dependent	a
Lead	7439-92-1	11	40.5	0.0537	500	50	11	a
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV	Nutrient	
Manganese	7439-96-5	220	NSV	NSV	NSV	500	220	a
Mercury	7439-97-6	NSV	0.00051	0.1	0.1	0.3	0.00051	b
Nickel	7440-02-0	38	30	13.6	200	30	38	a
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV	Nutrient	
Selenium	7782-49-2	0.52	0.21	0.0276	70	1	0.52	a
Silver	7440-22-4	4.2	2	4.04	NSV	2	4.2	a
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV	Nutrient	
Thallium	7440-28-0	NSV	1	0.0569	NSV	1	1	b
Vanadium	7440-62-2	7.8	2	1.59	NSV	2	7.8	a
Zinc	7440-66-6	46	8.5	6.62	200	50	46	a
Cyanide								
Cyanide, Total	57-12-5	NSV	NSV	1.33	NSV	NSV	1.33	c
Polychlorinated Biphenyls								
Aroclor 1016	12674-11-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Aroclor 1221	11104-28-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Aroclor 1260	11096-82-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Organochlorine Pesticides								
4,4'-DDE	72-55-9	0.021 [g]	NSV	0.596	NSV	NSV	0.021	a
4,4'-DDT	50-29-3	0.021 [g]	NSV	0.0035	NSV	NSV	0.021	a
Methoxychlor	72-43-5	NSV	NSV	0.0199	NSV	NSV	0.0199	c
Nitroaromatics								
Amino-2,6-dinitrotoluene, 4-	19406-51-0	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328	c
Amino-4,6-dinitrotoluene, 2-	35572-78-2	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328	c
Dinitrotoluene, 2,4-	121-14-2	NSV	NSV	1.28	NSV	NSV	1.28	c
Dinitrotoluene, 2,6-	606-20-2	NSV	NSV	0.0328	NSV	NSV	0.0328	c
Semivolatile Organic Compounds								
Acenaphthylene	208-96-8	29	NSV	682	NSV	NSV	29	a
Anthracene	120-12-7	29	NSV	1480	NSV	NSV	29	a
Benzo(a)anthracene	56-55-3	1.1	NSV	5.21	NSV	NSV	1.1	a
Benzo(a)pyrene	50-32-8	1.1	NSV	1.52	NSV	NSV	1.1	a
Benzo(b)fluoranthene	205-99-2	1.1	NSV	59.8	NSV	NSV	1.1	a
Benzo(ghi)perylene	191-24-2	1.1	NSV	119	NSV	NSV	1.1	a
Benzo(k)fluoranthene	207-08-9	1.1	NSV	148	NSV	NSV	1.1	a
Benzoic acid	65-85-0	NSV	NSV	NSV	NSV	NSV	NSV	
bis(2-Ethylhexyl)phthalate	117-81-7	NSV	NSV	0.925	NSV	NSV	0.925	c
Chrysene	218-01-9	1.1	NSV	4.73	NSV	NSV	1.1	a

Table B-1

Ecological Screening Values for Soil
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)	Reference
Dibenzofuran	132-64-9	NSV	NSV	NSV	NSV	NSV	NSV	
Di-n-butyl phthalate	84-74-2	NSV	200	0.15	NSV	200	200	b
Fluoranthene	206-44-0	1.1	NSV	122	NSV	NSV	1.1	a
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	NSV	109	NSV	NSV	1.1	a
Methylnaphthalene, 2-	91-57-6	29	NSV	3.24	NSV	NSV	3.24	c
Naphthalene	91-20-3	29	NSV	0.0994	NSV	NSV	29	a
Phenanthrene	85-01-8	29	NSV	45.7	NSV	NSV	29	a
Pyrene	129-00-0	1.1	NSV	78.5	NSV	NSV	1.1	a
Volatile Organic Compounds								
Acetone	67-64-1	NSV	NSV	2.5	NSV	NSV	2.5	c
Benzene	71-43-2	NSV	NSV	0.255	NSV	NSV	0.255	c
Bromomethane	74-83-9	NSV	NSV	0.235	NSV	NSV	0.235	c
Butanone, 2-	78-93-3	NSV	NSV	89.6	NSV	NSV	89.6	c
Carbon disulfide	75-15-0	NSV	NSV	0.0941	NSV	NSV	0.0941	c
Dichloroethane, 1,1-	75-34-3	NSV	NSV	20.1	NSV	NSV	20.1	c
Dichloroethene, 1,1-	75-35-4	NSV	NSV	8.28	NSV	NSV	8.28	c
Dichloroethene, cis-1,2-	156-59-2	NSV	NSV	0.784 [h]	NSV	NSV	0.784	c
Methylene chloride	75-09-2	NSV	NSV	4.05	NSV	NSV	4.05	c
Toluene	108-88-3	NSV	200	5.45	NSV	200	200	b
Trichloroethane, 1,1,1-	79-00-5	NSV	NSV	29.8	NSV	NSV	29.8	c
Trichloroethene	79-01-6	NSV	NSV	12.4	NSV	NSV	12.4	c
Trimethylbenzene, 1,2,4-	95-63-6	NSV	NSV	NSV	NSV	NSV	NSV	
Xylene, Total	1330-20-7	NSV	NSV	10	NSV	NSV	10	c

EPA - U.S. Environmental Protection Agency.
ESV - Ecological screening value.
NSV - No screening value available.
mg/kg - Milligrams per kilogram.

Priority for Selection of ESVs:
1) EPA Eco-SSL
2) PRG for Eco Endpoints, (Efroymson, et.al, 1997a)
3) EPA Region 5 Ecological Screening Levels
4) Efroymson, 1997b
5) Efroymson, 1997c

[a] EPA, 2008, Ecological Soil Screening Level (SSL) guidance. On-line at: http://www.epa.gov/ecotox/ecossl/index.html
[b] Efroymson, 1997a, *Preliminary Remediation Goals for Ecological Endpoints* . www.esd.ornl.gov/programs/ecorisk/documents/tm162r2.pdf .
[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level (ESL)* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.
[d] Efroymson, R.A., M.E. Will, G.W. Suter, 1997b, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision, ES/ER/TM-126/R2 (microbial screening values are not included). http://www.esd.ornl.gov/programs/ecorisk/documents/tm126r21.pdf.
[e] Efroymson, R.A., M.E. Will, G.W. Suter, 1997c, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision, ES/ER/TM-85/R3. http://www.esd.ornl.gov/programs/ecorisk/documents/tm85r3.pdf
[f] Based on the screening value for total PCBs.
[g] Based on the screening value for DDT and metabolites.
[h] Based on the screening value for dichloroethylene [trans-1,2].

Table B-2

Ecological Screening Values for Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	Ohio Water Quality Criteria [a] µg/L		Eco PRG [b] µg/L	EPA Region 5 ESV [c] µg/L	Selected Surface Water ESV [d] µg/L
Inorganic Analytes						
Aluminum	7429-90-5	NSV		87	NSV	87
Arsenic	7440-38-2	150	f	3.1	148	3.1
Barium	7440-39-3	220		4	220	4
Beryllium	7440-41-7	100	e	0.66	3.6	0.66
Calcium	7440-70-2	NSV		NSV	NSV	Nutrient
Chromium	7440-47-3	270	e,f	210	42	42
Cobalt	7440-48-4	24		23	24	23
Copper	7440-50-8	30	e,f	12	1.58	1.58
Iron	7439-89-6	NSV		1000	NSV	1000
Lead	7439-92-1	37	e,f	3.2	1.17	1.17
Magnesium	7439-95-4	NSV		NSV	NSV	Nutrient
Manganese	7439-96-5	NSV		120	NSV	120
Nickel	7440-02-0	170	e,f	160	28.9	28.9
Potassium	7440-09-7	NSV		NSV	NSV	Nutrient
Selenium	7782-49-2	5	f	0.39	5	0.39
Sodium	7440-23-5	NSV		NSV	NSV	Nutrient
Vanadium	7440-62-2	44		20	12	12
Zinc	7440-66-6	390	e,f	110	65.7	65.7
Semivolatile Organic Compounds						
bis(2-Ethylhexyl)phthalate	117-81-7	8.4		0.12	0.3	0.12
Volatile Organic Compounds						
Dichloroethane, 1,1-	75-34-3	410		47	47	47
Dichloroethene, cis-1,2-	156-59-2	970		590	970	590
Trichloroethane, 1,1,1-	71-55-6	76		11	76	11

COPEC - Chemical of potential ecological concern.
ESV - Ecological screening value.
µg/L - Microgram per liter.
NSV - No screening value available.

[a] Ohio Environmental Protection Agency (OEPA, 2002), Division of Surface Water, Water Quality Standards, Chapter 3745-1 of the Ohio Administrative Code, Dec 30. http://www.epa.state.oh.us/dsw/rules/3745-1.html. Value is the Outside Mixing Zone Average value.

[b] *Preliminary Remediation Goals (PRG) for Ecological Endpoints* , (Efroymson et. al., 1997).

[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.

[d] Surface water ESVs are selected by choosing the minimum screening value based on the three sources provided.

[e] Hardness dependent value (see Table 7-9 in the OAC Chapters 3741-1 and 3791-2). Screening values using a hardness of 400 mg/L $CaCO_3$ were selected, based on a site-specific water hardness of 464 mg/L $CaCO_3$.

[f] Total Recoverable (TR) value is used, per Ohio Administrative Code Chapter 3745-2-04.

Table B-3

Ecological Screening Values for Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	TEC [a] mg/kg	EPA Region 5 ESV [b] mg/kg	Ecological PRG [c] mg/kg	Ontario Sediment Quality Guidelines [d] mg/kg	Selected ESV [e] mg/kg
Inorganic Analytes						
Aluminum	7429-90-5	NSV	NSV	NSV	NSV	NSV
Antimony	7440-36-0	NSV	NSV	NSV	NSV	NSV
Arsenic	7440-38-2	9.79	9.79	42	6	9.79
Barium	7440-39-3	NSV	NSV	NSV	NSV	NSV
Beryllium	7440-41-7	NSV	NSV	NSV	NSV	NSV
Cadmium	7440-43-9	0.99	0.99	4.2	0.6	0.99
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV
Chromium	7440-47-3	43.4	43.4	159	26	43.4
Cobalt	7440-48-4	NSV	50	NSV	50	50
Copper	7440-50-8	31.6	31.6	77.7	16	31.6
Iron	7439-89-6	NSV	NSV	NSV	NSV	NSV
Lead	7439-92-1	35.8	35.8	110	31	35.8
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV
Manganese	7439-96-5	NSV	NSV	NSV	460	460
Mercury	7439-97-6	0.18	0.174	0.7	0.2	0.18
Nickel	7440-02-0	22.7	22.7	38.5	16	22.7
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV
Selenium	7782-49-2	NSV	NSV	NSV	NSV	NSV
Silver	7440-22-4	NSV	0.5	1.8	0.5	0.5
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV
Thallium	7440-28-0	NSV	NSV	NSV	NSV	NSV
Vanadium	7440-62-2	NSV	NSV	NSV	NSV	NSV
Zinc	7440-66-6	121	121	270	120	121
Nitroaromatics						
2,4,6-Trinitrotoluene	118-96-7	NSV	NSV	NSV	NSV	NSV
Polychlorinated Biphenyls						
Aroclor 1254	11097-69-1	0.0598	0.0598	72	0.07	0.0598
Aroclor 1260	11096-82-5	0.0598	0.0598	63	0.07	0.0598
Semivolatile Organic Compounds						
Benzo(a)anthracene	56-55-3	0.108	0.108	0.69	0.32	0.108
Benzo(a)pyrene	50-32-8	0.15	0.15	0.394	0.37	0.15
Benzo(b)fluoranthene	205-99-2	NSV	10.4	NSV	NSV	10.4
Benzo(ghi)perylene	191-24-2	NSV	0.17	6.3	0.17	0.17
Benzo(k)fluoranthene	207-08-9	NSV	0.24	NSV	0.24	0.24

Table B-3

Ecological Screening Values for Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	TEC [a] mg/kg	EPA Region 5 ESV [b] mg/kg	Ecological PRG [c] mg/kg	Ontario Sediment Quality Guidelines [d] mg/kg	Selected ESV [e] mg/kg
Chrysene	218-01-9	0.166	0.166	0.85	0.34	0.166
Dibenzofuran	132-64-9	NSV	0.449	0.42	NSV	0.449
Di-n-butyl phthalate	84-74-2	NSV	1.114	240	NSV	1.114
Fluoranthene	206-44-0	NSV	0.423	0.834	0.75	0.423
Indeno(1,2,3-cd)pyrene	193-39-5	NSV	0.2	0.837	0.2	0.2
Methylnaphthalene, 2-	91-57-6	NSV	0.0202	NSV	NSV	0.0202
Naphthalene	91-20-3	0.176	0.176	0.39	NSV	0.176
Phenanthrene	85-01-8	0.204	0.204	0.54	0.56	0.204
Pyrene	129-00-0	0.195	0.195	1.4	0.49	0.195
Volatiles Organic Compounds						
Acetone	67-64-1	NSV	0.0099	0.0091	NSV	0.0099
Carbon disulfide	75-15-0	NSV	0.0239	0.00086	NSV	0.0239
Methylene chloride	75-09-2	NSV	0.159	18	NSV	0.159

ESV - Ecological screening value.
mg/kg - Milligrams per kilogram.
NSV - No screening value available.

Priority for Selection of ESVs:

1. Threshold effect concentrations (MacDonald et al., 2000)
2. EPA Region 5 ESLs (EPA, 2003)
3. Sediment PRGs (Efroymson, 1997)
4. Sediment quality criteria (OME, 1993)

[a] Threshold Effect Concentrations (TECs), MacDonald, et al., 2000, *Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems,* Arch Environ Contam Toxicol 39:20-31.

[b] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.

[c] Efroymson,et. al., 1997, *Preliminary Remediation Goals for Ecological Endpoints* .

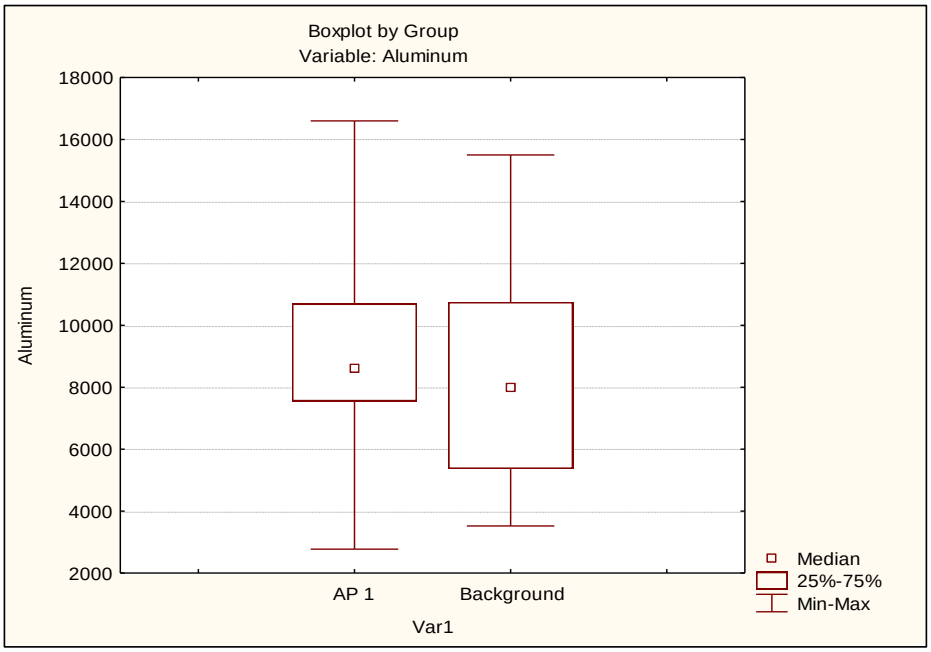
[d] Ontario Ministry of the Environment, 1993 (OME, 1993). Persaud, et al. *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario,* August.

APPENDIX C

WILCOXON RANK SUM TEST RESULTS AND BOX PLOTS FOR ASH PIT 1

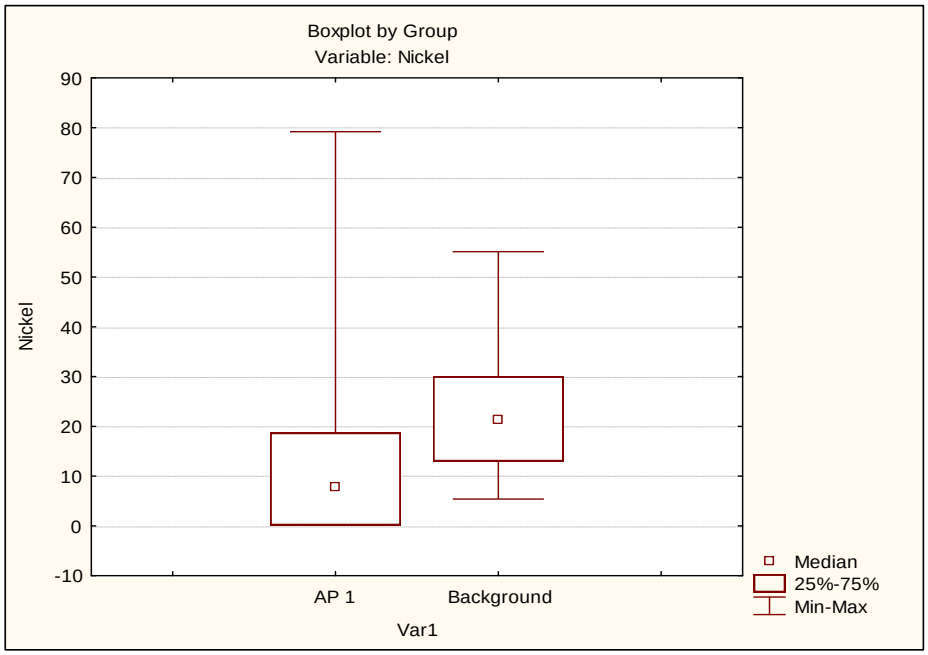
Appendix C

Wilcoxon Rank Sum Test Results and Box Plots for Soil Concentrations of Aluminum in Background Vs. Ash Pit 1 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Aluminum	404	191	113	0.68471	0.494	0.6848	0.493	22	12	0.510503

Wilcoxon Rank Sum Test Results and Box Plots for Soil Concentrations of Nickel in Background Vs. Ash Pit 1 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Nickel	402.0000	774.0000	149.0000	-2.83475	0.004586	-2.83491	0.004584	22	26	0.004053

APPENDIX D

ASSESSMENT RECEPTOR PROFILES

Appendix D

Assessment Receptor Profiles

Eastern Cottontail (Sylvilagus floridanus). These medium-size grazing herbivores are found over most of the eastern half of the United States and southern Canada, and have been widely introduced into the western U.S. Environmental Protection Agency ([EPA], 1993). The eastern cottontail is unique to the genus because of the large variety of habitats that it occupies, including glades and woodlands, deserts, swamps, prairies, hardwood forests, rain forests, and boreal forests (EPA, 1993). Open grassy areas are generally are used for grazing at night, whereas dense, heavy cover typically is used for shelter during the day (EPA, 1993). During the summer seasons these rabbits consume herbaceous plants (e.g. grasses, clover, timothy, and alfalfa), whereas winter diet typically consists of woody vines, shrubs and trees (e.g.. birch, maple, and apple) (EPA, 1993). Home range is 3 to 20 acres, with larger ranges in the summer and smaller ranges in the winter (Burt and Grossenheider, 1980). Populations fluctuate from 1 to 4 cottontail per four acres to several per acre in winter conditions (Burt and Grossenheider, 1980). The eastern cottontail breeds from February through September and usually produces 3 to 4 litters per year of 1 to 9 young (usually 4 to 5); however, this rabbit's' death rate vies with its birth rate, and few rabbits live for more than one year (Whitaker, 1995). The average longevity is 1.25 years (EPA, 1993).

References:

Burt, W.H. and R.P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J.O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Deer Mouse (Peromyscus maniculatus). This medium-sized mouse is found in the eastern United States from the Hudson Bay to Pennsylvania, the southern Appalachians, central Arkansas, and central Texas. In the west it is found from Mexico to the south Yukon and north-west territories (Whitaker, 1995). Deer mice habitat includes nearly every dry land habitat within its range, including forest, grasslands, or a mixture of the two (Burt and Grossenheider, 1980).

Nocturnal and active year-round, these mice construct nests in the ground, trees, stumps, and buildings (Burt and Grossenheider, 1980). Omnivorous, the deer mouse feeds on nuts and seeds (e.g., jewel weed and black cherry pits), fruits, beetles, caterpillars, and other insects. Deer mice may cache their food during the fall and winter in the more northern parts of their range (EPA, 1993). Home range is 0.15 to 3 acres (Burt and Grossenheider, 1980; EPA, 1993). Density of populations is 4 to 12 mice per acre, and average life span is 2 years in the wild (Burt and Grossenheider, 1980). The breeding season is from February to November, depending on latitude. Three to five young are born in each of two to four litters per year (Burt and Grossenheider, 1980). They are gray- to red-brown with a white belly and a distinctly short-haired, bicolor tail (Whitaker, 1995). Weight range is 14.8 (EPA, 1993) to 33 grams (Whitaker, 1995).

References:

Burt, W.H. and R.P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J.O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Mallard Duck (Anas platyrhynchos). The mallard duck is widespread throughout most of the United States and is the most abundant of the United States ducks. It is large, migratory duck with an average body size of 58 centimeters from bill to tail tip. Wintering mallards prefer the natural bottom-land wetlands and rivers where water depths are 20 to 40 centimeters. The primary habitat requirement for nesting is thought to be dense grassy vegetation. Nests are generally located within a few kilometers of water (EPA, 1993).

In winter, mallards feed primarily on seeds, invertebrates, agricultural grains and, to a limited extent, leaves, stems, buds, rootlets, and tubers. In spring, females shift mostly to a diet of invertebrates to support molting and egg laying activities. Ducklings also feed mainly on invertebrates to help support their rapid growth rates. Mallards are serially monogamous and remate annually. Each pair of mallards establishes a territory and the drake defends it against other mallards. Average home range size varies, depending upon the type of habitat available. High rates of nest failure require the females to renest persistently, with average clutch size decreasing as the breeding season progresses. Annual adult mortality rates vary with year,

depending on location, hunting pressure, age, and sex. Females suffer greater natural mortality rates than do males (EPA, 1993).

The typical home range of the mallard is from 540 to 620 hectares (ha) for adult female and male birds, respectively, for wetlands and river habitat in Minnesota (USEPA, 1993). For the current ERA, an average home range of 580 ha was used. The typical migration schedule is from mid-March through mid-May for the spring migration. The fall migration typically starts in mid-October, and peaks in November (USEPA, 1993).

References:

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Red-Tailed Hawk (Buteo jamacensis). This carnivorous hawk is one of the most common and widespread members of the genus *Buteo* in the continental United States and Canada (Brown and Amadon, 1968). Red-tailed hawks live in a variety of habitats, such as farmlands, woodlands, mountains, and deserts, as long as there is open country interdispersed with woods, bluffs, or streamside trees. They are primarily carnivorous, feeding on (greater than 85 percent) small rodents, as well as fish. Other prey items include amphibians, reptiles, crayfish, and other birds (Adamcik, et al., 1979; Ehrlich, et al., 1988). Home range has been reported as approximately 66.8 acres, with a population density of 0.16 pairs per acre (Janes, 1984), although EPA (1993) reports an average territory size of 842 hectares (2,080 acres). Breeding population density is one nest per 0.009 acre or one individual per 0.004 acre. Body weight for male red-tails is 1,028.6 to 1,142.9 grams, and for females 1,371.4 to 1,600 grams (Brown and Amadon, 1968), although EPA (1993) reports an average body weight of 957 grams. They typically mate for life or until one of the pair dies, with pairs clinging to territories year after year (Austing, 1964).

References:

Adamcik, R.S., A.W. Todd, and L.B. Keith, 1979, "Demographic and Dietary Responses of Red-Tailed Hawks During a Snowshoe Hare Fluctuation," ***Canadian Field Naturalist***, Vol. 93, pp. 16-27.

Austing, G.R., 1964, ***The World of the Red-Tailed Hawk***, J. B. Lippincott Co., Philadelphia.

Brown, L. and D. Amadon, 1968, ***Eagles, Hawks, and Falcons of the World***, Vol. 1, McGraw-Hill Book Company, New York.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye, 1988, ***The Birder's Handbook: A field guide to the Natural History of North American Birds***, Simon and Shuster, Inc., New York.

Janes, S.W., 1984, "Influences of Territory Composition and Interspecific Competition on Red-Tailed Hawk Reproductive Success," ***Ecology***, 65:862-870.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Raccoon (Procyon lotor). Raccoons are native only in the Americas. Their range extends from the southern edge of the southern provinces of Canada and most of the United States, except for portions of the Rocky Mountain states, central Nevada, and Utah (Whitaker, 1995). The raccoon weighs from 3 to 15 kilograms (Merritt, 1987; EPA, 1993) and has a head and body length of 46 to 71 centimeters and a tail length of 20 to 30 centimeters (Burt and Grossenheider, 1980). The raccoon is nocturnal and solitary, except when breeding or caring for its young. During particularly cold spells, the raccoon may sleep for several days at a time but does not hibernate (Whitaker, 1995). The raccoon is found along lakes near wooded areas or rock cliffs (Burt and Grossenheider, 1980), but prefers wooded streams (Whitaker, 1995). The raccoon is highly omnivorous and is an opportunistic feeder, consuming virtually any animal or plant matter that is available (Merritt, 1987; EPA, 1993). Animal matter predominates the diet during the spring and early summer; plant matter predominates during late summer, autumn, and winter (Merritt, 1987; EPA, 1993). The home range of the raccoon extends up to 3.2 kilometers across, but usually it is less than 1.6 kilometers. Population densities range from one per acre (highest) to one per 15 acres (considered high) (Burt and Grossenheider, 1980). Captive raccoons live for approximately 14 years (Burt and Grossenheider, 1980). Average body weight is 5.1 kilograms (EPA, 1993).

References:

Burt, W.H., and R.P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

Merritt, J.F., 1987, ***Guide to the Mammals of Pennsylvania***, University of Pittsburgh Press, Pennsylvania.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook, Volume I of II***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J.O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Short-tailed Shrew (Blarina brevicauda). This shrew is the largest found in North America. It is solid grey above and below, with a short tail, and weighs between 15 and 29 grams (Whitaker, 1995). Total length of this shrew is 76 to 102 millimeters (Burt and Grossenheider, 1980). The range of this shrew extends from southeastern Canada and the northeastern U.S. to Nebraska, Missouri, Kentucky, and in the mountains to Alabama (Whitaker, 1995). Preferable habitat for the shrew includes forests, grasslands, marshes, and brushy areas. It will make a nest of dry leaves, grass, and hair beneath logs, stumps, rocks, or debris (Burt and Grossenheider, 1980). This underground tunneler may burrow as deep as 6 feet, and has a voracious appetite, eating one half of its own body weight per day of earthworms, other terrestrial vertebrates, and sometimes young mice (Whitaker, 1995). Mean population densities range from 5.7 in the winter, to 28 per acre in the summer (EPA, 1993). Their home range varies from 0.5 to 1 acre (Burt and Grossenheider, 1980). Longevity is typically around 20 months (EPA, 1993), with five to eight young born to each of two to three litters (Burt and Grossenheider, 1980).

References:

Burt, W.H. and R.P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J.O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

White-tailed Deer (Odocoileus virginianus). The white-tailed deer is a member of the Family Cervidae. They are large, even-toed, hoofed mammals with long legs. Their coat is predominantly light brown or chestnut colored, with the underparts being white. Deer are primarily herbivorous grazers and browsers, constantly moving from one food source to the next. The deer's diet changes seasonally. When available, farm crops such as winter wheat, corn, alfalfa, soy beans, and hay are important components of the species diet. Other top food items include wild crab apples, sumac, grasses, green briar, clover, jewelweed, acorns, and dogwood. In regions where the climate varies from season to season, deer may make annual migrations of 10 to 20 miles in the search for food. However, in Ohio, deer typically have rather small home ranges (2 to 3 square miles) and are reluctant to leave this range. The average weight for the

species is 88 kilograms for males and 61 kilograms for females. Breeding season ranges from November through February, with the young offspring born in May and early June. Virtually all yearling and adult does conceive each year, and in Ohio usually carry twins. Triplets and quadruplets have also been recorded Gottschang (1981).

References:

Gottschang, J.L., 1981, ***A Guide to the Mammals of Ohio***, The Ohio State University Press, pp. 143-149.

Marsh Wren (Cistothorus palustris). The marsh wren is a small bird (4 to 4.5 inches in length) which inhabits freshwater cattail marshes and salt marshes. Nesting pairs are not likely to occupy other habitats and the species avoids the wet meadow and sedge meadow habitats preferred by sedge wrens. Marsh wrens breed throughout most of the northern half of the United States and in coastal areas as far south as Florida. The species eats mostly insects, and occasionally snails and other invertebrates. The average body weight is 0.01 kilograms, and the average home range for the species is 0.054 hectares. Because the species is polygamous, there may be more females than males inhabiting a breeding marsh. Densities as high as 120 birds per hectare have been recorded (EPA, 1993). Marsh wrens' nests are globular structures placed at heights of 2 to 5 feet in dense vegetation. The males commonly build dummy nests in addition to the one where the eggs will be laid (Peterjohn and Rice, 1991).

References:

U.S. Environmental Protection Agency (EPA), Office of Research and Development, 1993, ***Wildlife Exposure Factors Handbook***, EPA/600/R-93/187a.

Peterjohn, B.G., and Rice, D.L., 1991, ***The Ohio Breeding Bird Atlas***, The Ohio Department of Natural Resources.

Muskrat (Ondata zibethicus). The muskrat is a member of the Family Muridaee. Muskrats are the most aquatic of this family of rodents, and spend much of their lives in or near bogs, marshes, lakes or streams. Their diet consists primarily of aquatic vegetation (in particular the roots or basal portions of aquatic plants), although they can be omnivorous if other food sources are more common. Marsh grasses, sedges, and cattails are important muskrat food items. They are indigenous and common throughout most of the United States. Muskrats have relatively small home ranges that vary in configuration based on the physical attributes of their aquatic habitat. The average weight for the species is approximately 1.3 kilograms for males and 1.2 kilograms for females during the winter, and 0.9 kg for males and 0.8 kg for females during the

spring. Muskrats typically breed during the first spring after birth, and typically produce 1-12 pups, with southern populations producing more litters, but fewer pups per litter compared with northern populations (EPA, 1993).

References:

U.S. Environmental Protection Agency (EPA), Office of Research and Development, 1993, ***Wildlife Exposure Factors Handbook***, EPA/600/R-93/187a.

APPENDIX E

FOOD CHAIN MODEL EXPOSURE DOSES AND HAZARD QUOTIENTS

Table E-1

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Deer Mouse
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+00	1.93E+00	6.75E-01	1.93E+01	6.75E-02
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							1.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.26E-01	9.79E-03	1.26E+00	9.79E-04
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							1.19E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-02	5.10E+00	2.33E-03	1.98E+01	6.01E-04
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-01	0.00E+00	3.30E+00	0.00E+00
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							2.85E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-03	1.17E+01	2.44E-04	1.51E+01	1.89E-04
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							2.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-03	8.00E+00	2.79E-04	8.00E+01	2.79E-05
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							1.24E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-01	8.80E+01	1.41E-03	2.84E+02	4.38E-04
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	5.26E-04	0.00E+00	0.00E+00	4.16E-02	0.00E+00	1.46E-02	0.00E+00	0.00E+00	5.67E-02	1.30E+01	4.37E-03	1.32E+02	4.30E-04
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	5.13E-03	0.00E+00	0.00E+00	8.56E-02	0.00E+00	8.21E-02	0.00E+00	0.00E+00	1.73E-01	2.00E-01	8.64E-01	3.30E-01	5.24E-01
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							2.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-03	2.10E-01	1.42E-02	2.10E+00	1.42E-03
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							1.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-02	1.60E+02	8.66E-05	3.20E+02	4.33E-05
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	0.00E+00	6.80E-01	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E+00	0.00E+00	1.23E+01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-03	0.00E+00	0.00E+00	1.28E-02	0.00E+00	2.97E-02	0.00E+00	0.00E+00	4.56E-02	4.00E+00	1.14E-02	2.00E+01	2.28E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-03	0.00E+00	0.00E+00	1.70E-02	0.00E+00	6.34E-02	0.00E+00	0.00E+00	8.46E-02	1.00E+00	8.46E-02	1.00E+01	8.46E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-03	0.00E+00	0.00E+00	3.89E-02	0.00E+00	1.31E-02	0.00E+00	0.00E+00	5.59E-02	7.20E+00	7.77E-03	3.60E+01	1.55E-03
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01	0.00E+00	7.15E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+00	0.00E+00	2.57E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-03	0.00E+00	0.00E+00	2.57E-02	0.00E+00	6.44E-02	0.00E+00	0.00E+00	9.31E-02	7.50E+00	1.24E-02	3.75E+01	2.48E-03

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\, xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
Some BAF (or BCF) values based on media regression equations (value in box):
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0.61	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.39	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.000056	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0028	kg/d
Body weight =	0.0148	kg
Home range =	0.153	acres
Water intake rate =	0.0022	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-2

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Short-Tailed Shrew
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Total Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	7.80E+02							1.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E+00	1.93E+00	6.97E-01	1.93E+01	6.97E-02
Arsenic	8.30E-03	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	1.74E+02							1.27E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	1.26E-01	1.01E-02	1.26E+00	1.01E-03
Barium	8.00E-02	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	1.46E+02							1.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-02	5.10E+00	2.41E-03	1.98E+01	6.20E-04
Beryllium	0.00E+00	mg/L	1.60E+00	ng/k	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-01	0.00E+00	3.30E+00	0.00E+00
Copper	1.92E-02	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	1.21E+03							2.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-03	1.17E+01	2.52E-04	1.51E+01	1.94E-04
Lead	1.50E-02	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	6.38E+01							2.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-03	8.00E+00	2.88E-04	8.00E+01	2.88E-05
Manganese	8.36E-01	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	2.47E+02							1.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-01	8.80E+01	1.46E-03	2.84E+02	4.51E-04
Mercury	0.00E+00	mg/L	0.00E+00	ng/k	9.35E-02	mg/kg	1.00E+00			5.29E+00		1.09E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	7.25E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.40E-02	1.30E+01	5.69E-03	1.32E+02	5.60E-04
Selenium	0.00E+00	mg/L	0.00E+00	ng/k	1.06E+00	mg/kg	1.00E+00			9.14E-01		5.11E-01	6.37E-01	6.37E-01	0.00E+00	0.00E+00	1.62E-02	0.00E+00	0.00E+00	1.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-01	2.00E-01	7.90E-01	3.30E-01	4.79E-01
Vanadium	2.00E-02	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	4.46E+02							3.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-03	2.10E-01	1.46E-02	2.10E+00	1.46E-03
Zinc	9.32E-02	mg/L	0.00E+00	ng/k	0.00E+00	mg/kg	1.00E+00	1.22E+03							1.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-02	1.60E+02	8.93E-05	3.20E+02	4.47E-05
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	ng/k	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	0.00E+00	6.80E-01	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	ng/k	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E+00	0.00E+00	1.23E+01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	ng/k	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	ng/k	4.58E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.99E-03	0.00E+00	0.00E+00	1.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-02	4.00E+00	5.27E-03	2.00E+01	1.05E-03
Fluoranthene	0.00E+00	mg/L	0.00E+00	ng/k	3.56E-01	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.43E-03	0.00E+00	0.00E+00	1.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-02	1.00E+00	1.64E-02	1.00E+01	1.64E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	ng/k	7.10E-01	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-02	0.00E+00	0.00E+00	5.31E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.39E-02	7.20E+00	8.88E-03	3.60E+01	1.78E-03
Napthalene	0.00E+00	mg/L	3.37E-01	ng/k	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01	0.00E+00	7.15E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	ng/k	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+00	0.00E+00	2.57E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	ng/k	2.60E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.97E-03	0.00E+00	0.00E+00	1.72E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-02	7.50E+00	2.82E-03	3.75E+01	5.63E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRixCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.0002288	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0022	kg/d
Body weight =	0.015	kg
Home range =	0.96	acres
Water intake rate =	0.0023	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-3

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Cottontail Rabbit
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							2.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-01	1.93E+00	1.15E-01	1.93E+01	1.15E-02
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							2.11E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-04	1.26E-01	1.67E-03	1.26E+00	1.67E-04
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							2.03E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-03	5.10E+00	3.98E-04	1.98E+01	1.03E-04
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-01	0.00E+00	3.30E+00	0.00E+00
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							4.87E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-04	1.17E+01	4.16E-05	1.51E+01	3.22E-05
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							3.81E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-04	8.00E+00	4.76E-05	8.00E+01	4.76E-06
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							2.12E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-02	8.80E+01	2.41E-04	2.84E+02	7.47E-05
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.94E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-03	0.00E+00	0.00E+00	3.00E-03	1.30E+01	2.31E-04	1.32E+02	2.27E-05
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	1.89E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-02	0.00E+00	0.00E+00	1.76E-02	2.00E-01	8.82E-02	3.30E-01	5.35E-02
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							5.07E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-04	2.10E-01	2.42E-03	2.10E+00	2.42E-04
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							2.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-03	1.60E+02	1.48E-05	3.20E+02	7.39E-06
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	0.00E+00	6.80E-01	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E+00	0.00E+00	1.23E+01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.69E-03	0.00E+00	0.00E+00	6.85E-03	4.00E+00	1.71E-03	2.00E+01	3.42E-04
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	0.00E+00	0.00E+00	1.37E-02	1.00E+00	1.37E-02	1.00E+01	1.37E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-03	0.00E+00	0.00E+00	3.96E-03	7.20E+00	5.50E-04	3.60E+01	1.10E-04
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01	0.00E+00	7.15E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+00	0.00E+00	2.57E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-02	0.00E+00	0.00E+00	1.34E-02	7.50E+00	1.79E-03	3.75E+01	3.58E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,x\,Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
Some BAF (or BCF) values based on media regression equations (value in box):
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	1	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.006048	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.096	kg/d
Body weight =	1.132	kg
Home range =	7.66	acres
Water intake rate =	0.11	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.26109661	unitless
Exposure Frequency (EF) =	1	unitless

Table E-4

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Marsh Wren
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							2.37E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E+00	1.10E+02	2.15E-02	1.10E+03	2.15E-03
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							2.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-03	5.14E+00	4.36E-04	1.28E+01	1.75E-04
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							2.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-02	2.08E+01	1.04E-03	4.17E+01	5.18E-04
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							5.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.18E-03	4.70E+01	1.10E-04	6.17E+01	8.40E-05
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							4.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-03	1.13E+00	3.58E-03	1.13E+01	3.58E-04
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							2.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-01	9.77E+02	2.31E-04	9.77E+03	2.31E-05
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	8.06E-04	0.00E+00	0.00E+00	1.63E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-01	4.50E-01	3.65E-01	9.00E-01	1.83E-01
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	7.86E-03	0.00E+00	0.00E+00	3.36E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	5.00E-01	6.88E-01	1.00E+00	3.44E-01
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E-03	1.14E+01	4.75E-04	1.14E+02	4.75E-05
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							2.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.45E+01	1.74E-03	1.31E+02	1.92E-04
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	0.00E+00	1.80E+00	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E+01	0.00E+00	2.28E+02	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	3.50E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-03	0.00E+00	0.00E+00	5.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.53E-02	1.40E-01	3.95E-01	7.00E-01	7.90E-02
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.37E-03	0.00E+00	0.00E+00	6.69E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-02	3.95E+01	1.86E-03	3.95E+02	1.86E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-03	0.00E+00	0.00E+00	1.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-01	1.00E+00	1.59E-01	5.00E+00	3.18E-02
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+01	0.00E+00	1.50E+02	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	5.00E+00	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-03	0.00E+00	0.00E+00	1.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-01	3.95E+01	2.67E-03	3.95E+02	2.67E-04

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.000058	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0029	kg/d
Body weight =	0.01	kg
Home range =	0.13	acres
Water intake rate =	0.0027	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-5

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the White-Tailed Deer
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Total Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.99E-04	1.93E+00	4.66E-04	1.93E+01	4.66E-05
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							8.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E-07	1.26E-01	6.75E-06	1.26E+00	6.75E-07
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							8.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-06	5.10E+00	1.61E-06	1.98E+01	4.14E-07
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.60E-01	0.00E+00	3.30E+00	0.00E+00
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							1.97E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-06	1.17E+01	1.68E-07	1.51E+01	1.30E-07
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							1.54E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-06	8.00E+00	1.92E-07	8.00E+01	1.92E-08
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							8.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.57E-05	8.80E+01	9.73E-07	2.84E+02	3.02E-07
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	9.35E-02	mg/kg	1.00E+00			5.29E+00		1.09E+00	1.92E-01	1.92E-01	0.00E+00	0.00E+00	9.58E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-06	0.00E+00	0.00E+00	5.34E-06	1.30E+01	4.11E-07	1.32E+02	4.04E-08
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.06E+00	mg/kg	1.00E+00			9.14E-01		5.11E-01	6.37E-01	6.37E-01	0.00E+00	0.00E+00	1.09E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-05	0.00E+00	0.00E+00	2.88E-05	2.00E-01	1.44E-04	3.30E-01	8.73E-05
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							2.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-06	2.10E-01	9.76E-06	2.10E+00	9.76E-07
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							9.55E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.55E-06	1.60E+02	5.97E-08	3.20E+02	2.98E-08
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	0.00E+00	6.80E-01	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E+00	0.00E+00	1.23E+01	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	4.58E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.27E-06	0.00E+00	0.00E+00	7.74E-06	4.00E+00	1.94E-06	2.00E+01	3.87E-07
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	3.56E-01	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-06	0.00E+00	0.00E+00	9.48E-06	1.00E+00	9.48E-06	1.00E+01	9.48E-07
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	7.10E-01	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-06	0.00E+00	0.00E+00	4.73E-06	7.20E+00	6.57E-07	3.60E+01	1.31E-07
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01	0.00E+00	7.15E+01	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+00	0.00E+00	2.57E+01	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	2.60E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-06	0.00E+00	0.00E+00	9.86E-06	7.50E+00	1.31E-06	3.75E+01	2.63E-07

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
Some BAF (or BCF) values based on media regression equations (value in box):
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	1	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.04	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	2	kg/d
Body weight =	61	kg
Home range =	1280	acres
Water intake rate =	4	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.0015625	unitless
Exposure Frequency (EF) =	1	unitless

Table E-6

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Raccoon
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							3.84E-03	0.00E+00	0.00E+00	3.62E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-02	1.93E+00	2.08E-02	1.93E+01	2.08E-03
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							3.64E-06	0.00E+00	0.00E+00	7.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-05	1.26E-01	8.96E-05	1.26E+00	8.96E-06
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							3.50E-05	0.00E+00	0.00E+00	6.19E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	5.10E+00	1.90E-05	1.98E+01	4.89E-06
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	1.99E-05	0.00E+00	0.00E+00	4.80E-04	0.00E+00	4.60E-05	0.00E+00	0.00E+00	0.00E+00	5.45E-04	6.60E-01	8.26E-04	3.30E+00	1.65E-04
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							8.41E-06	0.00E+00	0.00E+00	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-04	1.17E+01	1.12E-05	1.51E+01	8.69E-06
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							6.57E-06	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-05	8.00E+00	1.45E-06	8.00E+01	1.45E-07
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							3.66E-04	0.00E+00	0.00E+00	1.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-03	8.80E+01	1.66E-05	2.84E+02	5.14E-06
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.73E-06	0.00E+00	0.00E+00	4.48E-05	0.00E+00	7.05E-06	3.53E-07	0.00E+00	5.39E-05	1.00E+00	5.39E-05	5.00E+00	1.08E-05
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	9.21E-05	0.00E+00	3.96E-05	9.80E-06	0.00E+00	1.58E-04	2.00E-01	7.92E-04	3.30E-01	4.80E-04
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							8.76E-06	0.00E+00	0.00E+00	4.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-05	2.10E-01	2.66E-04	2.10E+00	2.66E-05
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							4.08E-05	0.00E+00	0.00E+00	6.01E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.42E-04	1.60E+02	4.01E-06	3.20E+02	2.00E-06
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	1.41E-06	0.00E+00	0.00E+00	2.01E-05	0.00E+00	4.02E-09	0.00E+00	0.00E+00	0.00E+00	2.15E-05	6.80E-02	3.16E-04	6.80E-01	3.16E-05
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	7.67E-06	0.00E+00	0.00E+00	1.47E-04	0.00E+00	9.25E-06	0.00E+00	0.00E+00	0.00E+00	1.64E-04	2.45E+00	6.70E-05	1.23E+01	1.34E-05
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	1.51E-06	0.00E+00	0.00E+00	9.76E-06	0.00E+00	1.06E-06	0.00E+00	0.00E+00	0.00E+00	1.23E-05	1.00E+00	1.23E-05	1.00E+01	1.23E-06
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-05	0.00E+00	0.00E+00	1.38E-05	0.00E+00	1.43E-05	0.00E+00	0.00E+00	3.84E-05	4.00E+00	9.61E-06	2.00E+01	1.92E-06
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-05	0.00E+00	0.00E+00	1.83E-05	0.00E+00	3.06E-05	0.00E+00	0.00E+00	6.26E-05	1.00E+00	6.26E-05	1.00E+01	6.26E-06
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-05	0.00E+00	0.00E+00	4.19E-05	0.00E+00	6.33E-06	0.00E+00	0.00E+00	6.11E-05	7.20E+00	8.49E-06	3.60E+01	1.70E-06
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	4.19E-06	0.00E+00	0.00E+00	8.06E-05	0.00E+00	2.29E-04	0.00E+00	0.00E+00	0.00E+00	3.13E-04	1.43E+01	2.19E-05	7.15E+01	4.38E-06
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	3.81E-06	0.00E+00	0.00E+00	1.50E-05	0.00E+00	2.26E-05	0.00E+00	0.00E+00	0.00E+00	4.14E-05	5.14E+00	8.05E-06	2.57E+01	1.61E-06
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	2.43E-06	9.65E-06	0.00E+00	1.41E-05	2.77E-05	7.81E-06	3.10E-05	0.00E+00	0.00E+00	9.27E-05	7.50E+00	1.24E-05	3.75E+01	2.47E-06

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0.21	unitless
Aquatic plant diet fraction =	0.21	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0.02	unitless
Aq. Invert diet fraction =	0.21	unitless
Terr. Invert diet fraction =	0.3	unitless
Mammal diet fraction =	0.05	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.01222	kg/d
Sediment ingestion rate =	0.01222	kg/d
Food ingestion rate =	0.26	kg/d
Body weight =	5.1	kg
Home range =	385	acres
Water intake rate =	0.43	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.00519481	unitless
Exposure Frequency (EF) =	1	unitless

Table E-7

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Red-Tailed Hawk
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							5.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.02E-04	1.10E+02	4.57E-06	1.10E+03	4.57E-07
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							4.75E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-07	5.14E+00	9.25E-08	1.28E+01	3.70E-08
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							4.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-06	2.08E+01	2.20E-07	4.17E+01	1.10E-07
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							1.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-06	4.70E+01	2.34E-08	6.17E+01	1.78E-08
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							8.59E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-07	3.85E+00	2.23E-07	3.85E+01	2.23E-08
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							4.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-05	9.77E+02	4.90E-08	9.77E+03	4.90E-09
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	1.59E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-06	3.67E-07	1.69E-06	4.50E-01	3.75E-06	9.00E-01	1.88E-06
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	1.55E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E-05	1.02E-05	4.39E-05	4.40E-01	9.98E-05	1.50E+00	2.93E-05
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							1.15E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-06	1.14E+01	1.01E-07	1.14E+02	1.01E-08
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							5.34E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-06	1.45E+01	3.68E-07	1.31E+02	4.07E-08
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	0.00E+00	1.80E+00	0.00E+00
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E+01	0.00E+00	2.28E+02	0.00E+00
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	3.50E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-07	1.40E-01	6.78E-06	7.00E-01	1.36E-06
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	3.95E+01	3.19E-08	3.95E+02	3.19E-09
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	1.00E+00	1.18E-06	5.00E+00	2.37E-07
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+01	0.00E+00	1.50E+02	0.00E+00
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	5.00E+00	0.00E+00
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.88E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.88E-07	3.95E+01	2.25E-08	3.95E+02	2.25E-09

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
Some BAF (or BCF) values based on media regression equations (value in box):
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0.00114	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.057	kg/d
Body weight =	0.957	kg
Home range =	2080	acres
Water intake rate =	0.057	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.0009615	unitless
Exposure Frequency (EF) =	1	unitless

Table E-8

Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Muskrat
Ash Pit 1
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Aluminum	8.77E+00	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	7.80E+02							8.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.22E-01	1.93E+00	4.26E-01	1.93E+01	4.26E-02
Arsenic	8.30E-03	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.74E+02							7.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.78E-04	1.26E-01	6.17E-03	1.26E+00	6.17E-04
Barium	8.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.46E+02							7.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-03	5.10E+00	1.47E-03	1.98E+01	3.79E-04
Beryllium	0.00E+00	mg/L	1.60E+00	mg/kg	0.00E+00	mg/kg	1.00E+00		5.39E+00		5.16E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	0.00E+00	0.00E+00	0.00E+00	2.48E-01	6.60E-01	3.75E-01	3.30E+00	7.51E-02
Copper	1.92E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.21E+03							1.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-03	1.17E+01	1.54E-04	1.51E+01	1.19E-04
Lead	1.50E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	6.38E+01							1.41E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-03	8.00E+00	1.76E-04	8.00E+01	1.76E-05
Manganese	8.36E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							7.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.83E-02	8.80E+01	8.90E-04	2.84E+02	2.76E-04
Mercury	0.00E+00	mg/L	0.00E+00	mg/kg	1.39E-01	mg/kg	1.00E+00			4.06E+00		9.12E-01	1.92E-01	1.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	5.00E+00	0.00E+00
Selenium	0.00E+00	mg/L	0.00E+00	mg/kg	1.36E+00	mg/kg	1.00E+00			8.55E-01		5.24E-01	5.46E-01	5.46E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	3.30E-01	0.00E+00
Vanadium	2.00E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	4.46E+02							1.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-03	2.10E-01	8.92E-03	2.10E+00	8.92E-04
Zinc	9.32E-02	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	1.22E+03							8.73E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.73E-03	1.60E+02	5.46E-05	3.20E+02	2.73E-05
PCBs																													
Aroclor 1260	0.00E+00	mg/L	1.13E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		3.20E+00		6.40E-04				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-05	0.00E+00	0.00E+00	0.00E+00	2.17E-05	6.80E-02	3.19E-04	6.80E-01	3.19E-05
Semivolatile Organics																													
2-Methylnaphthalene	0.00E+00	mg/L	6.16E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		2.70E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-02	0.00E+00	0.00E+00	0.00E+00	4.99E-02	2.45E+00	2.04E-02	1.23E+01	4.07E-03
Benzo(a)anthracene	0.00E+00	mg/L	1.21E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.57E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E-03	0.00E+00	0.00E+00	0.00E+00	5.70E-03	1.00E+00	5.70E-03	1.00E+01	5.70E-04
Benzo(b)fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	8.29E-01	mg/kg	1.00E+00			2.10E-01		3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E+00	0.00E+00	2.00E+01	0.00E+00
Fluoranthene	0.00E+00	mg/L	0.00E+00	mg/kg	1.10E+00	mg/kg	1.00E+00			2.10E-01		5.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	mg/L	0.00E+00	mg/kg	1.03E+00	mg/kg	1.00E+00			5.10E-01		1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.20E+00	0.00E+00	3.60E+01	0.00E+00
Napthalene	0.00E+00	mg/L	3.37E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		4.30E+00		1.22E+01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E+00	0.00E+00	0.00E+00	0.00E+00	1.23E+00	1.43E+01	8.62E-02	7.15E+01	1.72E-02
Phenanthrene	0.00E+00	mg/L	3.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		8.80E-01		1.33E+00				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-01	0.00E+00	0.00E+00	0.00E+00	1.22E-01	5.14E+00	2.37E-02	2.57E+01	4.74E-03
Pyrene	0.00E+00	mg/L	1.95E-01	mg/kg	7.75E-01	mg/kg	1.00E+00		1.30E+00	4.50E-01	7.20E-01	7.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-02	0.00E+00	0.00E+00	0.00E+00	4.21E-02	7.50E+00	5.61E-03	3.75E+01	1.12E-03

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	1	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.352	kg/d
Body weight =	1.174	kg
Home range =	0.3	acres
Water intake rate =	0.11	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

APPENDIX F

DATA USED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Acenaphthene	83-32-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00739
Acenaphthene	83-32-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00717
Acenaphthene	83-32-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00882
Acenaphthene	83-32-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00755
Acenaphthene	83-32-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00873
Acenaphthene	83-32-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00696
Acenaphthene	83-32-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00826
Acenaphthene	83-32-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.007255
Acenaphthene	83-32-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0427
Acenaphthene	83-32-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00722
Acenaphthene	83-32-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00807
Acenaphthene	83-32-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00728
Acenaphthene	83-32-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0376
Acenaphthene	83-32-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00843
Acenaphthene	83-32-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00966
Acenaphthene	83-32-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00727
Acenaphthene	83-32-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthene	83-32-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Acenaphthene	83-32-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthene	83-32-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Acenaphthylene	208-96-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Acenaphthylene	208-96-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Acenaphthylene	208-96-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Acenaphthylene	208-96-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Acenaphthylene	208-96-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Acenaphthylene	208-96-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Acenaphthylene	208-96-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Acenaphthylene	208-96-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.004835
Acenaphthylene	208-96-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Acenaphthylene	208-96-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Acenaphthylene	208-96-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Acenaphthylene	208-96-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Acenaphthylene	208-96-8	0.2785	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.02505
Acenaphthylene	208-96-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Acenaphthylene	208-96-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Acenaphthylene	208-96-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Acenaphthylene	208-96-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Acenaphthylene	208-96-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Acenaphthylene	208-96-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Acenaphthylene	208-96-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Aluminum	7429-90-5	6190	mg/kg	3.97	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.99
Aluminum	7429-90-5	9230	mg/kg	3.31	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		1.65
Aluminum	7429-90-5	9360	mg/kg	4.61	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		2.3
Aluminum	7429-90-5	8380	mg/kg	3.44	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		1.72
Aluminum	7429-90-5	9940	mg/kg	4.18		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.09
Aluminum	7429-90-5	2770	mg/kg	3.92		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.96
Aluminum	7429-90-5	12700	mg/kg	4.09		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.05
Aluminum	7429-90-5	7125	mg/kg	3.77		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		1.885
Aluminum	7429-90-5	10700	mg/kg	4.12		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.06
Aluminum	7429-90-5	6260	mg/kg	3.91		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		1.96
Aluminum	7429-90-5	10500	mg/kg	4.54	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		2.27
Aluminum	7429-90-5	13000	mg/kg	3.61	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		1.81
Aluminum	7429-90-5	7555	mg/kg	3.81		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		1.9
Aluminum	7429-90-5	6700	mg/kg	3.87	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		1.94
Aluminum	7429-90-5	7650	mg/kg	4.84	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		2.42
Aluminum	7429-90-5	7640	mg/kg	3.35	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		1.68
Aluminum	7429-90-5	7550	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		28.25
Aluminum	7429-90-5	12700	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Aluminum	7429-90-5	8310	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4
Aluminum	7429-90-5	12600	mg/kg	25.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		25.3
Aluminum	7429-90-5	8820	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Aluminum	7429-90-5	16600	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Anthracene	120-12-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Anthracene	120-12-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Anthracene	120-12-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Anthracene	120-12-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Anthracene	120-12-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Anthracene	120-12-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Anthracene	120-12-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Anthracene	120-12-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0087
Anthracene	120-12-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Anthracene	120-12-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Anthracene	120-12-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Anthracene	120-12-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Anthracene	120-12-7	0.2155	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.0451
Anthracene	120-12-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0101
Anthracene	120-12-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Anthracene	120-12-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Anthracene	120-12-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Anthracene	120-12-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Anthracene	120-12-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Anthracene	120-12-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Antimony	7440-36-0	0.23	mg/kg	0.46	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Antimony	7440-36-0	0.258	mg/kg	0.514	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	J	0.257
Antimony	7440-36-0	0.2975	mg/kg	0.595	UJ	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Antimony	7440-36-0	0.294	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Antimony	7440-36-0	0.347	mg/kg	0.526	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.263
Antimony	7440-36-0	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Antimony	7440-36-0	0.352	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Antimony	7440-36-0	0.2115	mg/kg	0.423	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4	UU	0.2115
Antimony	7440-36-0	0.416	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Antimony	7440-36-0	0.2405	mg/kg	0.481	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.241
Antimony	7440-36-0	0.2885	mg/kg	0.577	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Antimony	7440-36-0	0.2275	mg/kg	0.455	UJ	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.227
Antimony	7440-36-0	0.838	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.2375
Antimony	7440-36-0	0.348	mg/kg	0.531	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.265
Antimony	7440-36-0	0.305	mg/kg	0.61	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Antimony	7440-36-0	0.2335	mg/kg	0.467	UJ	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Antimony	7440-36-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	1.4
Antimony	7440-36-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Antimony	7440-36-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Antimony	7440-36-0	0.65	mg/kg	1.3	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	1.3
Antimony	7440-36-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Antimony	7440-36-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Aroclor 1016	12674-11-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1016	12674-11-2	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1016	12674-11-2	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1016	12674-11-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1016	12674-11-2	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1016	12674-11-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1016	12674-11-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1016	12674-11-2	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Aroclor 1016	12674-11-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1016	12674-11-2	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1221	11104-28-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1221	11104-28-2	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1221	11104-28-2	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1221	11104-28-2	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1221	11104-28-2	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1221	11104-28-2	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1221	11104-28-2	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1221	11104-28-2	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1221	11104-28-2	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1221	11104-28-2	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1221	11104-28-2	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1221	11104-28-2	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1221	11104-28-2	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1232	11141-16-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1232	11141-16-5	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1232	11141-16-5	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1232	11141-16-5	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1232	11141-16-5	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1232	11141-16-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1232	11141-16-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1232	11141-16-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1232	11141-16-5	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1232	11141-16-5	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1232	11141-16-5	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1232	11141-16-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1232	11141-16-5	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1242	53469-21-9	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1242	53469-21-9	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1242	53469-21-9	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1242	53469-21-9	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1242	53469-21-9	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1242	53469-21-9	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1242	53469-21-9	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1242	53469-21-9	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1242	53469-21-9	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1242	53469-21-9	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1242	53469-21-9	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1242	53469-21-9	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1242	53469-21-9	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1248	12672-29-6	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1248	12672-29-6	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1248	12672-29-6	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1248	12672-29-6	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1248	12672-29-6	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1248	12672-29-6	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1248	12672-29-6	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1248	12672-29-6	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1248	12672-29-6	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1248	12672-29-6	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1248	12672-29-6	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1248	12672-29-6	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1248	12672-29-6	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1254	11097-69-1	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1254	11097-69-1	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1254	11097-69-1	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1254	11097-69-1	0.1145	mg/kg	0.229	U	ASH PIT 1-SB04	AP0010	PCBS	REG	9-Dec-08	0	1	U	0.0459
Aroclor 1254	11097-69-1	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1254	11097-69-1	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1254	11097-69-1	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1254	11097-69-1	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1254	11097-69-1	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1254	11097-69-1	0.105	mg/kg	0.21	UU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	UU	0.04205
Aroclor 1254	11097-69-1	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Aroclor 1254	11097-69-1	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Aroclor 1254	11097-69-1	0.1	mg/kg	0.2	U	ASH PIT 1-SB09	AP0027	PCBS	REG	8-Dec-08	3	4	U	0.04
Aroclor 1260	11096-82-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB01	AP0001	PCBS	REG	8-Dec-08	0.5	1.5	U	0.0404
Aroclor 1260	11096-82-5	0.1005	mg/kg	0.201	U	ASH PIT 1-SB01	AP0002	PCBS	REG	8-Dec-08	3.5	5.5	U	0.0402
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB02	AP0004	PCBS	REG	8-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.1215	mg/kg	0.243	U	ASH PIT 1-SB03	AP0007	PCBS	REG	9-Dec-08	0	1	U	0.0487
Aroclor 1260	11096-82-5	0.0955	mg/kg	0.191	U	ASH PIT 1-SB03	AP0008	PCBS	REG	9-Dec-08	3	5	U	0.0382
Aroclor 1260	11096-82-5	0.02	mg/kg	0.04	UU	ASH PIT 1-SB04	AP0011AP0012	PEST/PCB	AVGD	39791	3	4	UU	#DIV/0!
Aroclor 1260	11096-82-5	0.1185	mg/kg	0.237	U	ASH PIT 1-SB05	AP0014	PCBS	REG	9-Dec-08	0	1	U	0.0475
Aroclor 1260	11096-82-5	0.101	mg/kg	0.202	U	ASH PIT 1-SB05	AP0015	PCBS	REG	9-Dec-08	3	3.7	U	0.0404
Aroclor 1260	11096-82-5	0.114	mg/kg	0.228	U	ASH PIT 1-SB06	AP0017	PCBS	REG	8-Dec-08	0.8	1.8	U	0.0456
Aroclor 1260	11096-82-5	0.1025	mg/kg	0.205	U	ASH PIT 1-SB06	AP0018	PCBS	REG	8-Dec-08	5	5.8	U	0.0411
Aroclor 1260	11096-82-5	0.1025	mg/kg	0.21	JU	ASH PIT 1-SB08	AP0023AP0063	PCBS	AVGD	39791	0	1	JU	0.04205
Aroclor 1260	11096-82-5	0.119	mg/kg	0.238	U	ASH PIT 1-SB08	AP0024	PCBS	REG	9-Dec-08	3	5	U	0.0476
Aroclor 1260	11096-82-5	0.1345	mg/kg	0.269	U	ASH PIT 1-SB09	AP0026	PCBS	REG	8-Dec-08	0	1	U	0.0539
Arsenic	7440-38-2	6.7	mg/kg	0.919	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.46
Arsenic	7440-38-2	8.3	mg/kg	1.03	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.514
Arsenic	7440-38-2	9.14	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.595
Arsenic	7440-38-2	6.17	mg/kg	0.957	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.479
Arsenic	7440-38-2	13.2	mg/kg	1.05		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.526
Arsenic	7440-38-2	5.62	mg/kg	0.898		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.449
Arsenic	7440-38-2	11.7	mg/kg	1.06		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.531
Arsenic	7440-38-2	3.57	mg/kg	0.8455		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.423
Arsenic	7440-38-2	9.06	mg/kg	1.1		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.551
Arsenic	7440-38-2	11.6	mg/kg	0.962		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.481
Arsenic	7440-38-2	6.4	mg/kg	1.15	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.577
Arsenic	7440-38-2	7.53	mg/kg	0.909	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.455
Arsenic	7440-38-2	10.95	mg/kg	0.9515		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.476
Arsenic	7440-38-2	9.98	mg/kg	1.06	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.531
Arsenic	7440-38-2	12.6	mg/kg	1.22	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.61
Arsenic	7440-38-2	5.13	mg/kg	0.933	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.467
Arsenic	7440-38-2	8.1	mg/kg	1.4		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		1.4
Arsenic	7440-38-2	19.6	mg/kg	2.6		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		2.6
Arsenic	7440-38-2	9.4	mg/kg	1.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		1.7
Arsenic	7440-38-2	15.8	mg/kg	1.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		1.3
Arsenic	7440-38-2	14	mg/kg	1.3		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.3
Arsenic	7440-38-2	31.2	mg/kg	2.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		2.4
Barium	7440-39-3	32.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Barium	7440-39-3	37.7	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Barium	7440-39-3	83.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Barium	7440-39-3	35.9	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Barium	7440-39-3	107	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Barium	7440-39-3	13	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Barium	7440-39-3	105	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Barium	7440-39-3	92.4	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.09425
Barium	7440-39-3	82.7	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Barium	7440-39-3	168	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Barium	7440-39-3	62.6	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Barium	7440-39-3	73.6	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Barium	7440-39-3	84.4	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.09535
Barium	7440-39-3	109	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Barium	7440-39-3	84.9	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Barium	7440-39-3	39	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Barium	7440-39-3	43	mg/kg	28.25		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		28.25
Barium	7440-39-3	163	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Barium	7440-39-3	41.3	mg/kg	33.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		33.4
Barium	7440-39-3	78.9	mg/kg	25.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		25.3
Barium	7440-39-3	160	mg/kg	25.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		25.9
Barium	7440-39-3	132	mg/kg	48.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		48.9
Benzo(a)anthracene	56-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)anthracene	56-55-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0262
Benzo(a)anthracene	56-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)anthracene	56-55-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0275
Benzo(a)anthracene	56-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)anthracene	56-55-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0254
Benzo(a)anthracene	56-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)anthracene	56-55-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.02645
Benzo(a)anthracene	56-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)anthracene	56-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0264
Benzo(a)anthracene	56-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)anthracene	56-55-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0266
Benzo(a)anthracene	56-55-3	0.8555	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.137
Benzo(a)anthracene	56-55-3	0.0642	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0308
Benzo(a)anthracene	56-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)anthracene	56-55-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0265

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Benzo(a)anthracene	56-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)anthracene	56-55-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)anthracene	56-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(a)pyrene	50-32-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.027
Benzo(a)pyrene	50-32-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0262
Benzo(a)pyrene	50-32-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0322
Benzo(a)pyrene	50-32-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0275
Benzo(a)pyrene	50-32-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0319
Benzo(a)pyrene	50-32-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0254
Benzo(a)pyrene	50-32-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Benzo(a)pyrene	50-32-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.02645
Benzo(a)pyrene	50-32-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.156
Benzo(a)pyrene	50-32-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0264
Benzo(a)pyrene	50-32-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0294
Benzo(a)pyrene	50-32-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0266
Benzo(a)pyrene	50-32-8	0.721	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.137
Benzo(a)pyrene	50-32-8	0.0534	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0308
Benzo(a)pyrene	50-32-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0353
Benzo(a)pyrene	50-32-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0265
Benzo(a)pyrene	50-32-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(a)pyrene	50-32-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(a)pyrene	50-32-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(b)fluoranthene	205-99-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0684
Benzo(b)fluoranthene	205-99-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0663
Benzo(b)fluoranthene	205-99-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0816
Benzo(b)fluoranthene	205-99-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0698
Benzo(b)fluoranthene	205-99-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0808
Benzo(b)fluoranthene	205-99-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0644
Benzo(b)fluoranthene	205-99-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0764
Benzo(b)fluoranthene	205-99-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.06705
Benzo(b)fluoranthene	205-99-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.395
Benzo(b)fluoranthene	205-99-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0668
Benzo(b)fluoranthene	205-99-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0746
Benzo(b)fluoranthene	205-99-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0674
Benzo(b)fluoranthene	205-99-2	1.205	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.3475
Benzo(b)fluoranthene	205-99-2	0.0829	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.078
Benzo(b)fluoranthene	205-99-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0894
Benzo(b)fluoranthene	205-99-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0672
Benzo(b)fluoranthene	205-99-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(b)fluoranthene	205-99-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(ghi)perylene	191-24-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzo(ghi)perylene	191-24-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzo(ghi)perylene	191-24-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzo(ghi)perylene	191-24-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzo(ghi)perylene	191-24-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzo(ghi)perylene	191-24-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzo(ghi)perylene	191-24-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzo(ghi)perylene	191-24-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.09815
Benzo(ghi)perylene	191-24-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzo(ghi)perylene	191-24-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzo(ghi)perylene	191-24-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzo(ghi)perylene	191-24-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzo(ghi)perylene	191-24-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.509
Benzo(ghi)perylene	191-24-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzo(ghi)perylene	191-24-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzo(ghi)perylene	191-24-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Benzo(ghi)perylene	191-24-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(ghi)perylene	191-24-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzo(k)fluoranthene	207-08-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.124
Benzo(k)fluoranthene	207-08-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.121
Benzo(k)fluoranthene	207-08-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.148

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Benzo(k)fluoranthene	207-08-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.127
Benzo(k)fluoranthene	207-08-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Benzo(k)fluoranthene	207-08-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.117
Benzo(k)fluoranthene	207-08-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.139
Benzo(k)fluoranthene	207-08-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.122
Benzo(k)fluoranthene	207-08-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.719
Benzo(k)fluoranthene	207-08-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.122
Benzo(k)fluoranthene	207-08-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.136
Benzo(k)fluoranthene	207-08-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.123
Benzo(k)fluoranthene	207-08-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.633
Benzo(k)fluoranthene	207-08-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.142
Benzo(k)fluoranthene	207-08-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.163
Benzo(k)fluoranthene	207-08-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.122
Benzo(k)fluoranthene	207-08-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Benzo(k)fluoranthene	207-08-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Benzoic acid	65-85-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzoic acid	65-85-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzoic acid	65-85-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzoic acid	65-85-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzoic acid	65-85-0	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzoic acid	65-85-0	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzoic acid	65-85-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzoic acid	65-85-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.09815
Benzoic acid	65-85-0	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzoic acid	65-85-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzoic acid	65-85-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzoic acid	65-85-0	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzoic acid	65-85-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.509
Benzoic acid	65-85-0	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzoic acid	65-85-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzoic acid	65-85-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Benzyl alcohol	100-51-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.1
Benzyl alcohol	100-51-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.097
Benzyl alcohol	100-51-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.119
Benzyl alcohol	100-51-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.102
Benzyl alcohol	100-51-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.118
Benzyl alcohol	100-51-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0942
Benzyl alcohol	100-51-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.112
Benzyl alcohol	100-51-6	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.09815
Benzyl alcohol	100-51-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.578
Benzyl alcohol	100-51-6	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0977
Benzyl alcohol	100-51-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.109
Benzyl alcohol	100-51-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0985
Benzyl alcohol	100-51-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.509
Benzyl alcohol	100-51-6	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.114
Benzyl alcohol	100-51-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.131
Benzyl alcohol	100-51-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0984
Beryllium	7440-41-7	5.74	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Beryllium	7440-41-7	4.87	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Beryllium	7440-41-7	10.8	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Beryllium	7440-41-7	5.99	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Beryllium	7440-41-7	13.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Beryllium	7440-41-7	3.62	mg/kg	0.196	J	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Beryllium	7440-41-7	16.5	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Beryllium	7440-41-7	7.305	mg/kg	0.1885	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.09425
Beryllium	7440-41-7	13.6	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Beryllium	7440-41-7	12.9	mg/kg	0.196	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Beryllium	7440-41-7	11.5	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Beryllium	7440-41-7	6.55	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Beryllium	7440-41-7	11.1	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.09535
Beryllium	7440-41-7	11.5	mg/kg	0.194	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Beryllium	7440-41-7	8.94	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Beryllium	7440-41-7	5.85	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Beryllium	7440-41-7	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	0.71
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Beryllium	7440-41-7	0.315	mg/kg	0.63	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.63
Beryllium	7440-41-7	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Beryllium	7440-41-7	1.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Bis(2-chloroethoxy)methane	111-91-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00863
Bis(2-chloroethoxy)methane	111-91-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00837

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Bis(2-chloroethoxy)methane	111-91-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0103
Bis(2-chloroethoxy)methane	111-91-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00881
Bis(2-chloroethoxy)methane	111-91-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0102
Bis(2-chloroethoxy)methane	111-91-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00812
Bis(2-chloroethoxy)methane	111-91-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00963
Bis(2-chloroethoxy)methane	111-91-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00846
Bis(2-chloroethoxy)methane	111-91-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0498
Bis(2-chloroethoxy)methane	111-91-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00843
Bis(2-chloroethoxy)methane	111-91-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00941
Bis(2-chloroethoxy)methane	111-91-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0085
Bis(2-chloroethoxy)methane	111-91-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.04385
Bis(2-chloroethoxy)methane	111-91-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00984
Bis(2-chloroethoxy)methane	111-91-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Bis(2-chloroethoxy)methane	111-91-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00848
Bis(2-chloroethoxy)methane	111-91-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethoxy)methane	111-91-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroethyl)ether	111-44-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0105
Bis(2-chloroethyl)ether	111-44-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0102
Bis(2-chloroethyl)ether	111-44-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0125
Bis(2-chloroethyl)ether	111-44-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0107
Bis(2-chloroethyl)ether	111-44-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0124
Bis(2-chloroethyl)ether	111-44-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00986
Bis(2-chloroethyl)ether	111-44-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0117
Bis(2-chloroethyl)ether	111-44-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0103
Bis(2-chloroethyl)ether	111-44-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0605
Bis(2-chloroethyl)ether	111-44-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0102
Bis(2-chloroethyl)ether	111-44-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0114
Bis(2-chloroethyl)ether	111-44-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0103
Bis(2-chloroethyl)ether	111-44-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.05325
Bis(2-chloroethyl)ether	111-44-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0119
Bis(2-chloroethyl)ether	111-44-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0137
Bis(2-chloroethyl)ether	111-44-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0103
Bis(2-chloroethyl)ether	111-44-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroethyl)ether	111-44-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-chloroisopropyl)ether	108-60-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0179
Bis(2-chloroisopropyl)ether	108-60-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0173
Bis(2-chloroisopropyl)ether	108-60-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Bis(2-chloroisopropyl)ether	108-60-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0182
Bis(2-chloroisopropyl)ether	108-60-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0211
Bis(2-chloroisopropyl)ether	108-60-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0168
Bis(2-chloroisopropyl)ether	108-60-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.02
Bis(2-chloroisopropyl)ether	108-60-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0175
Bis(2-chloroisopropyl)ether	108-60-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Bis(2-chloroisopropyl)ether	108-60-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0175
Bis(2-chloroisopropyl)ether	108-60-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0195
Bis(2-chloroisopropyl)ether	108-60-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0176
Bis(2-chloroisopropyl)ether	108-60-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0909
Bis(2-chloroisopropyl)ether	108-60-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0204
Bis(2-chloroisopropyl)ether	108-60-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0234
Bis(2-chloroisopropyl)ether	108-60-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0176
Bis(2-chloroisopropyl)ether	108-60-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-chloroisopropyl)ether	108-60-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bis(2-ethylhexyl)phthalate	117-81-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.038
Bis(2-ethylhexyl)phthalate	117-81-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0368
Bis(2-ethylhexyl)phthalate	117-81-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0453
Bis(2-ethylhexyl)phthalate	117-81-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0387
Bis(2-ethylhexyl)phthalate	117-81-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0448
Bis(2-ethylhexyl)phthalate	117-81-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0357
Bis(2-ethylhexyl)phthalate	117-81-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0424
Bis(2-ethylhexyl)phthalate	117-81-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.03725
Bis(2-ethylhexyl)phthalate	117-81-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.219
Bis(2-ethylhexyl)phthalate	117-81-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0371
Bis(2-ethylhexyl)phthalate	117-81-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0414

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Bis(2-ethylhexyl)phthalate	117-81-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0374
Bis(2-ethylhexyl)phthalate	117-81-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.193
Bis(2-ethylhexyl)phthalate	117-81-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0433
Bis(2-ethylhexyl)phthalate	117-81-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0496
Bis(2-ethylhexyl)phthalate	117-81-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0373
Bis(2-ethylhexyl)phthalate	117-81-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bis(2-ethylhexyl)phthalate	117-81-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Bromophenyl phenyl ether, 4-	101-55-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Bromophenyl phenyl ether, 4-	101-55-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
Bromophenyl phenyl ether, 4-	101-55-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Bromophenyl phenyl ether, 4-	101-55-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
Bromophenyl phenyl ether, 4-	101-55-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Bromophenyl phenyl ether, 4-	101-55-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
Bromophenyl phenyl ether, 4-	101-55-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Bromophenyl phenyl ether, 4-	101-55-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Bromophenyl phenyl ether, 4-	101-55-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
Bromophenyl phenyl ether, 4-	101-55-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Bromophenyl phenyl ether, 4-	101-55-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07455
Bromophenyl phenyl ether, 4-	101-55-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Bromophenyl phenyl ether, 4-	101-55-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Bromophenyl phenyl ether, 4-	101-55-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
Bromophenyl phenyl ether, 4-	101-55-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Bromophenyl phenyl ether, 4-	101-55-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Butyl benzyl phthalate	85-68-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Butyl benzyl phthalate	85-68-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0161
Butyl benzyl phthalate	85-68-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Butyl benzyl phthalate	85-68-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.017
Butyl benzyl phthalate	85-68-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Butyl benzyl phthalate	85-68-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0157
Butyl benzyl phthalate	85-68-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186
Butyl benzyl phthalate	85-68-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0163
Butyl benzyl phthalate	85-68-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Butyl benzyl phthalate	85-68-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0163
Butyl benzyl phthalate	85-68-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Butyl benzyl phthalate	85-68-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0164
Butyl benzyl phthalate	85-68-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.08465
Butyl benzyl phthalate	85-68-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.019
Butyl benzyl phthalate	85-68-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217
Butyl benzyl phthalate	85-68-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0164
Butyl benzyl phthalate	85-68-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Butyl benzyl phthalate	85-68-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Cadmium	7440-43-9	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Cadmium	7440-43-9	0.257	mg/kg	0.514	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.257
Cadmium	7440-43-9	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Cadmium	7440-43-9	0.345	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Cadmium	7440-43-9	0.263	mg/kg	0.526	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.263
Cadmium	7440-43-9	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Cadmium	7440-43-9	0.2655	mg/kg	0.531	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.266
Cadmium	7440-43-9	0.2815	mg/kg	0.423	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4	JJ	0.2115
Cadmium	7440-43-9	0.2755	mg/kg	0.551	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.276
Cadmium	7440-43-9	0.269	mg/kg	0.481	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	J	0.241
Cadmium	7440-43-9	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Cadmium	7440-43-9	0.2275	mg/kg	0.455	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.227
Cadmium	7440-43-9	0.2603	mg/kg	0.476	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1	JU	0.2375
Cadmium	7440-43-9	0.2655	mg/kg	0.531	U	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.265
Cadmium	7440-43-9	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Cadmium	7440-43-9	0.2335	mg/kg	0.467	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Cadmium	7440-43-9	0.14	mg/kg	0.28	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	0.28
Cadmium	7440-43-9	0.26	mg/kg	0.52	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	0.52
Cadmium	7440-43-9	0.165	mg/kg	0.33	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.33
Cadmium	7440-43-9	0.125	mg/kg	0.25	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.25

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Cadmium	7440-43-9	0.13	mg/kg	0.26	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.26
Cadmium	7440-43-9	0.245	mg/kg	0.49	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.49
Calcium	7440-70-2	14400	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Calcium	7440-70-2	35200	mg/kg	8.26		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		4.13
Calcium	7440-70-2	18800	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76
Calcium	7440-70-2	46600	mg/kg	8.61		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		4.31
Calcium	7440-70-2	9390	mg/kg	5.23		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		2.61
Calcium	7440-70-2	26700	mg/kg	4.9		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		2.45
Calcium	7440-70-2	3330	mg/kg	5.11		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		2.56
Calcium	7440-70-2	2680	mg/kg	4.715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		2.355
Calcium	7440-70-2	35100	mg/kg	5.16		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		2.58
Calcium	7440-70-2	2960	mg/kg	4.89		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		2.44
Calcium	7440-70-2	4580	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Calcium	7440-70-2	37800	mg/kg	9.03		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		4.51
Calcium	7440-70-2	12400	mg/kg	4.76		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		2.38
Calcium	7440-70-2	5380	mg/kg	4.84	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		2.42
Calcium	7440-70-2	15600	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Calcium	7440-70-2	46200	mg/kg	8.38		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		4.19
Calcium	7440-70-2	3840	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		707
Calcium	7440-70-2	6600	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Calcium	7440-70-2	5590	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Calcium	7440-70-2	3770	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Calcium	7440-70-2	6080	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Calcium	7440-70-2	59100	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Carbazole	86-74-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.041
Carbazole	86-74-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0398
Carbazole	86-74-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.049
Carbazole	86-74-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0419
Carbazole	86-74-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0485
Carbazole	86-74-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0386
Carbazole	86-74-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0458
Carbazole	86-74-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.04025
Carbazole	86-74-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.237
Carbazole	86-74-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0401
Carbazole	86-74-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0448
Carbazole	86-74-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0404
Carbazole	86-74-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.2085
Carbazole	86-74-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0468
Carbazole	86-74-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0536
Carbazole	86-74-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0403
Carbazole	86-74-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Carbazole	86-74-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Carbazole	86-74-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Carbazole	86-74-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloro-3-methylphenol, 4-	59-50-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Chloro-3-methylphenol, 4-	59-50-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0098
Chloro-3-methylphenol, 4-	59-50-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Chloro-3-methylphenol, 4-	59-50-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0103
Chloro-3-methylphenol, 4-	59-50-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Chloro-3-methylphenol, 4-	59-50-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00952
Chloro-3-methylphenol, 4-	59-50-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Chloro-3-methylphenol, 4-	59-50-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00991
Chloro-3-methylphenol, 4-	59-50-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584
Chloro-3-methylphenol, 4-	59-50-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00987
Chloro-3-methylphenol, 4-	59-50-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Chloro-3-methylphenol, 4-	59-50-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00995
Chloro-3-methylphenol, 4-	59-50-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0514
Chloro-3-methylphenol, 4-	59-50-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0115
Chloro-3-methylphenol, 4-	59-50-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132
Chloro-3-methylphenol, 4-	59-50-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00993
Chloro-3-methylphenol, 4-	59-50-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloro-3-methylphenol, 4-	59-50-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloroaniline, 4-	106-47-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0356
Chloroaniline, 4-	106-47-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0345
Chloroaniline, 4-	106-47-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0425
Chloroaniline, 4-	106-47-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0364
Chloroaniline, 4-	106-47-8	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0421
Chloroaniline, 4-	106-47-8	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0335
Chloroaniline, 4-	106-47-8	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0398

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Chloroaniline, 4-	106-47-8	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.03495
Chloroaniline, 4-	106-47-8	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.206
Chloroaniline, 4-	106-47-8	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0348
Chloroaniline, 4-	106-47-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0389
Chloroaniline, 4-	106-47-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0351
Chloroaniline, 4-	106-47-8	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.181
Chloroaniline, 4-	106-47-8	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0406
Chloroaniline, 4-	106-47-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Chloroaniline, 4-	106-47-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.035
Chloroaniline, 4-	106-47-8	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloroaniline, 4-	106-47-8	0.21	mg/kg	0.42	UJ	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloroaniline, 4-	106-47-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chloronaphthalene, 2-	91-58-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00653
Chloronaphthalene, 2-	91-58-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00633
Chloronaphthalene, 2-	91-58-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00779
Chloronaphthalene, 2-	91-58-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00667
Chloronaphthalene, 2-	91-58-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Chloronaphthalene, 2-	91-58-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00615
Chloronaphthalene, 2-	91-58-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00729
Chloronaphthalene, 2-	91-58-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.006405
Chloronaphthalene, 2-	91-58-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0377
Chloronaphthalene, 2-	91-58-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00638
Chloronaphthalene, 2-	91-58-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00712
Chloronaphthalene, 2-	91-58-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00643
Chloronaphthalene, 2-	91-58-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0332
Chloronaphthalene, 2-	91-58-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00745
Chloronaphthalene, 2-	91-58-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00854
Chloronaphthalene, 2-	91-58-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00642
Chloronaphthalene, 2-	91-58-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chloronaphthalene, 2-	91-58-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenol, 2-	95-57-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00505
Chlorophenol, 2-	95-57-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0049
Chlorophenol, 2-	95-57-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00603
Chlorophenol, 2-	95-57-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00516
Chlorophenol, 2-	95-57-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00597
Chlorophenol, 2-	95-57-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00476
Chlorophenol, 2-	95-57-8	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00564
Chlorophenol, 2-	95-57-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.004955
Chlorophenol, 2-	95-57-8	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0292
Chlorophenol, 2-	95-57-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00494
Chlorophenol, 2-	95-57-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00551
Chlorophenol, 2-	95-57-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00498
Chlorophenol, 2-	95-57-8	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0257
Chlorophenol, 2-	95-57-8	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00576
Chlorophenol, 2-	95-57-8	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0066
Chlorophenol, 2-	95-57-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00497
Chlorophenol, 2-	95-57-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenol, 2-	95-57-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenol, 2-	95-57-8	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chlorophenyl phenyl ether, 4-	7005-72-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0314
Chlorophenyl phenyl ether, 4-	7005-72-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0305
Chlorophenyl phenyl ether, 4-	7005-72-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0375
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0321
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0371
Chlorophenyl phenyl ether, 4-	7005-72-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0296
Chlorophenyl phenyl ether, 4-	7005-72-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0351
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0308
Chlorophenyl phenyl ether, 4-	7005-72-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.182
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0307
Chlorophenyl phenyl ether, 4-	7005-72-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0343
Chlorophenyl phenyl ether, 4-	7005-72-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0309
Chlorophenyl phenyl ether, 4-	7005-72-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1595
Chlorophenyl phenyl ether, 4-	7005-72-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0358
Chlorophenyl phenyl ether, 4-	7005-72-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0411
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0309

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chlorophenyl phenyl ether, 4-	7005-72-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Chromium	7440-47-3	10.6	mg/kg	0.496		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Chromium	7440-47-3	13.9	mg/kg	0.413		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.207
Chromium	7440-47-3	12.4	mg/kg	0.576		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288
Chromium	7440-47-3	11.9	mg/kg	0.431		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.215
Chromium	7440-47-3	13.6	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Chromium	7440-47-3	5.51	mg/kg	0.49		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.245
Chromium	7440-47-3	12	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Chromium	7440-47-3	11.6	mg/kg	0.4715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.2355
Chromium	7440-47-3	16.4	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Chromium	7440-47-3	13.5	mg/kg	0.489		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.244
Chromium	7440-47-3	14.6	mg/kg	0.567		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Chromium	7440-47-3	19.5	mg/kg	0.451		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.226
Chromium	7440-47-3	13	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.238
Chromium	7440-47-3	8.34	mg/kg	0.484		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.242
Chromium	7440-47-3	10.7	mg/kg	0.605		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Chromium	7440-47-3	11.7	mg/kg	0.419		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.209
Chromium	7440-47-3	13.2	mg/kg	0.71		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		0.71
Chromium	7440-47-3	12.2	mg/kg	1.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		1.3
Chromium	7440-47-3	18.1	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Chromium	7440-47-3	20.7	mg/kg	0.63		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.63
Chromium	7440-47-3	10.5	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Chromium	7440-47-3	13.5	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Chrysene	218-01-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0163
Chrysene	218-01-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0158
Chrysene	218-01-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0194
Chrysene	218-01-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0166
Chrysene	218-01-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0192
Chrysene	218-01-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0153
Chrysene	218-01-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0182
Chrysene	218-01-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.01595
Chrysene	218-01-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.094
Chrysene	218-01-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0159
Chrysene	218-01-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0177
Chrysene	218-01-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.016
Chrysene	218-01-9	0.85	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.0827
Chrysene	218-01-9	0.0675	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0186
Chrysene	218-01-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0213
Chrysene	218-01-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.016
Chrysene	218-01-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Chrysene	218-01-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Chrysene	218-01-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Chrysene	218-01-9	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Cobalt	7440-48-4	5.47	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Cobalt	7440-48-4	6.18	mg/kg	0.165		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Cobalt	7440-48-4	8.57	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Cobalt	7440-48-4	9.76	mg/kg	0.172		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Cobalt	7440-48-4	9.92	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Cobalt	7440-48-4	3.23	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Cobalt	7440-48-4	8.92	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Cobalt	7440-48-4	27.85	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.09425
Cobalt	7440-48-4	8.36	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Cobalt	7440-48-4	20.5	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Cobalt	7440-48-4	10.1	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Cobalt	7440-48-4	10.1	mg/kg	0.181		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Cobalt	7440-48-4	6.715	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.09535
Cobalt	7440-48-4	5.37	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Cobalt	7440-48-4	6.2	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Cobalt	7440-48-4	8.95	mg/kg	0.168		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Cobalt	7440-48-4	5.75	mg/kg	7.1	/U	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	U	7.1
Cobalt	7440-48-4	6.8	mg/kg	6.5		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		6.5
Cobalt	7440-48-4	4.2	mg/kg	8.4	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	8.4
Cobalt	7440-48-4	14.8	mg/kg	6.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		6.3
Cobalt	7440-48-4	8.6	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Cobalt	7440-48-4	26	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Copper	7440-50-8	15.4	mg/kg	0.496	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.248
Copper	7440-50-8	25.4	mg/kg	0.413	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.207
Copper	7440-50-8	27.3	mg/kg	0.576	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.288

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Copper	7440-50-8	37.7	mg/kg	0.431	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.215
Copper	7440-50-8	30.5	mg/kg	0.523		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.261
Copper	7440-50-8	7.71	mg/kg	0.49		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.245
Copper	7440-50-8	50	mg/kg	0.511		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.256
Copper	7440-50-8	10.4	mg/kg	0.4715		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.2355
Copper	7440-50-8	47.9	mg/kg	0.516		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.258
Copper	7440-50-8	10.4	mg/kg	0.489		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.244
Copper	7440-50-8	20.5	mg/kg	0.567	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.284
Copper	7440-50-8	27	mg/kg	0.451	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.226
Copper	7440-50-8	31.9	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.238
Copper	7440-50-8	21.3	mg/kg	0.484		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.242
Copper	7440-50-8	18.2	mg/kg	0.605	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.302
Copper	7440-50-8	26.6	mg/kg	0.419	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.209
Copper	7440-50-8	15.25	mg/kg	3.55		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		3.55
Copper	7440-50-8	32.1	mg/kg	3.3		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.3
Copper	7440-50-8	13.5	mg/kg	4.2		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		4.2
Copper	7440-50-8	27.9	mg/kg	3.2		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		3.2
Copper	7440-50-8	24	mg/kg	3.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		3.2
Copper	7440-50-8	34.2	mg/kg	6.1		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		6.1
Dibenz(a,h)anthracene	53-70-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0928
Dibenz(a,h)anthracene	53-70-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.09
Dibenz(a,h)anthracene	53-70-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.111
Dibenz(a,h)anthracene	53-70-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0947
Dibenz(a,h)anthracene	53-70-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.11
Dibenz(a,h)anthracene	53-70-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0874
Dibenz(a,h)anthracene	53-70-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.104
Dibenz(a,h)anthracene	53-70-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.091
Dibenz(a,h)anthracene	53-70-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.536
Dibenz(a,h)anthracene	53-70-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0906
Dibenz(a,h)anthracene	53-70-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.101
Dibenz(a,h)anthracene	53-70-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0914
Dibenz(a,h)anthracene	53-70-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.472
Dibenz(a,h)anthracene	53-70-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.106
Dibenz(a,h)anthracene	53-70-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.121
Dibenz(a,h)anthracene	53-70-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0912
Dibenz(a,h)anthracene	53-70-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenz(a,h)anthracene	53-70-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dibenzofuran	132-64-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0069
Dibenzofuran	132-64-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00669
Dibenzofuran	132-64-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00823
Dibenzofuran	132-64-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00704
Dibenzofuran	132-64-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00815
Dibenzofuran	132-64-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0065
Dibenzofuran	132-64-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00771
Dibenzofuran	132-64-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.006765
Dibenzofuran	132-64-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0399
Dibenzofuran	132-64-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00674
Dibenzofuran	132-64-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00753
Dibenzofuran	132-64-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0068
Dibenzofuran	132-64-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0351
Dibenzofuran	132-64-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00787
Dibenzofuran	132-64-9	0.0757	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.00902
Dibenzofuran	132-64-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00678
Dibenzofuran	132-64-9	0.2325	mg/kg	0.465	UJUJ	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.275	mg/kg	0.55	UJ	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dibenzofuran	132-64-9	0.21	mg/kg	0.42	UJ	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dibenzofuran	132-64-9	0.215	mg/kg	0.43	UJ	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dibenzofuran	132-64-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,2-	95-50-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00949
Dichlorobenzene, 1,2-	95-50-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0092
Dichlorobenzene, 1,2-	95-50-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0113
Dichlorobenzene, 1,2-	95-50-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00969
Dichlorobenzene, 1,2-	95-50-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0112
Dichlorobenzene, 1,2-	95-50-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00894
Dichlorobenzene, 1,2-	95-50-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0106
Dichlorobenzene, 1,2-	95-50-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.009305
Dichlorobenzene, 1,2-	95-50-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0548
Dichlorobenzene, 1,2-	95-50-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00927
Dichlorobenzene, 1,2-	95-50-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0104
Dichlorobenzene, 1,2-	95-50-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00934

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dichlorobenzene, 1,2-	95-50-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.04825
Dichlorobenzene, 1,2-	95-50-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0108
Dichlorobenzene, 1,2-	95-50-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0124
Dichlorobenzene, 1,2-	95-50-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00933
Dichlorobenzene, 1,2-	95-50-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,2-	95-50-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,3-	541-73-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0149
Dichlorobenzene, 1,3-	541-73-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0145
Dichlorobenzene, 1,3-	541-73-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0178
Dichlorobenzene, 1,3-	541-73-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0152
Dichlorobenzene, 1,3-	541-73-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0176
Dichlorobenzene, 1,3-	541-73-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.014
Dichlorobenzene, 1,3-	541-73-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0167
Dichlorobenzene, 1,3-	541-73-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0146
Dichlorobenzene, 1,3-	541-73-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0861
Dichlorobenzene, 1,3-	541-73-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0146
Dichlorobenzene, 1,3-	541-73-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0163
Dichlorobenzene, 1,3-	541-73-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0147
Dichlorobenzene, 1,3-	541-73-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07585
Dichlorobenzene, 1,3-	541-73-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.017
Dichlorobenzene, 1,3-	541-73-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0195
Dichlorobenzene, 1,3-	541-73-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0147
Dichlorobenzene, 1,3-	541-73-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,3-	541-73-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzene, 1,4-	106-46-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00801
Dichlorobenzene, 1,4-	106-46-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00777
Dichlorobenzene, 1,4-	106-46-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00956
Dichlorobenzene, 1,4-	106-46-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00818
Dichlorobenzene, 1,4-	106-46-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00946
Dichlorobenzene, 1,4-	106-46-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00754
Dichlorobenzene, 1,4-	106-46-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00894
Dichlorobenzene, 1,4-	106-46-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.007855
Dichlorobenzene, 1,4-	106-46-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0463
Dichlorobenzene, 1,4-	106-46-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00782
Dichlorobenzene, 1,4-	106-46-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00874
Dichlorobenzene, 1,4-	106-46-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00789
Dichlorobenzene, 1,4-	106-46-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0407
Dichlorobenzene, 1,4-	106-46-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00913
Dichlorobenzene, 1,4-	106-46-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0105
Dichlorobenzene, 1,4-	106-46-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00787
Dichlorobenzene, 1,4-	106-46-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzene, 1,4-	106-46-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorobenzidine, 3,3'-	91-94-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
Dichlorobenzidine, 3,3'-	91-94-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0394
Dichlorobenzidine, 3,3'-	91-94-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
Dichlorobenzidine, 3,3'-	91-94-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0415
Dichlorobenzidine, 3,3'-	91-94-1	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
Dichlorobenzidine, 3,3'-	91-94-1	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0383
Dichlorobenzidine, 3,3'-	91-94-1	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
Dichlorobenzidine, 3,3'-	91-94-1	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0399
Dichlorobenzidine, 3,3'-	91-94-1	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
Dichlorobenzidine, 3,3'-	91-94-1	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0397
Dichlorobenzidine, 3,3'-	91-94-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
Dichlorobenzidine, 3,3'-	91-94-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.04
Dichlorobenzidine, 3,3'-	91-94-1	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.2065
Dichlorobenzidine, 3,3'-	91-94-1	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0464
Dichlorobenzidine, 3,3'-	91-94-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531
Dichlorobenzidine, 3,3'-	91-94-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.04
Dichlorobenzidine, 3,3'-	91-94-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorobenzidine, 3,3'-	91-94-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dichlorobenzidine, 3,3'-	91-94-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dichlorophenol, 2,4-	120-83-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
Dichlorophenol, 2,4-	120-83-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
Dichlorophenol, 2,4-	120-83-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
Dichlorophenol, 2,4-	120-83-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
Dichlorophenol, 2,4-	120-83-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
Dichlorophenol, 2,4-	120-83-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
Dichlorophenol, 2,4-	120-83-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Dichlorophenol, 2,4-	120-83-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0144
Dichlorophenol, 2,4-	120-83-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
Dichlorophenol, 2,4-	120-83-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
Dichlorophenol, 2,4-	120-83-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
Dichlorophenol, 2,4-	120-83-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
Dichlorophenol, 2,4-	120-83-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07455
Dichlorophenol, 2,4-	120-83-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Dichlorophenol, 2,4-	120-83-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
Dichlorophenol, 2,4-	120-83-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
Dichlorophenol, 2,4-	120-83-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dichlorophenol, 2,4-	120-83-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Diethyl phthalate	84-66-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0166
Diethyl phthalate	84-66-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0161
Diethyl phthalate	84-66-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0198
Diethyl phthalate	84-66-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.017
Diethyl phthalate	84-66-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0196
Diethyl phthalate	84-66-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0157
Diethyl phthalate	84-66-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0186
Diethyl phthalate	84-66-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0163
Diethyl phthalate	84-66-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0961
Diethyl phthalate	84-66-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0163
Diethyl phthalate	84-66-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0181
Diethyl phthalate	84-66-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0164
Diethyl phthalate	84-66-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.08465
Diethyl phthalate	84-66-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.019
Diethyl phthalate	84-66-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0217
Diethyl phthalate	84-66-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0164
Diethyl phthalate	84-66-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Diethyl phthalate	84-66-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Diethyl phthalate	84-66-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethyl phthalate	131-11-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126
Dimethyl phthalate	131-11-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0122
Dimethyl phthalate	131-11-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Dimethyl phthalate	131-11-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0128
Dimethyl phthalate	131-11-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Dimethyl phthalate	131-11-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0118
Dimethyl phthalate	131-11-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014
Dimethyl phthalate	131-11-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0123
Dimethyl phthalate	131-11-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Dimethyl phthalate	131-11-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0123
Dimethyl phthalate	131-11-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Dimethyl phthalate	131-11-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0124
Dimethyl phthalate	131-11-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0639
Dimethyl phthalate	131-11-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0143
Dimethyl phthalate	131-11-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Dimethyl phthalate	131-11-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0124
Dimethyl phthalate	131-11-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethyl phthalate	131-11-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dimethylphenol, 2,4-	105-67-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0108
Dimethylphenol, 2,4-	105-67-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0105
Dimethylphenol, 2,4-	105-67-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dimethylphenol, 2,4-	105-67-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0111
Dimethylphenol, 2,4-	105-67-9	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0128
Dimethylphenol, 2,4-	105-67-9	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0102
Dimethylphenol, 2,4-	105-67-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0121
Dimethylphenol, 2,4-	105-67-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0106

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dimethylphenol, 2,4-	105-67-9	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0626
Dimethylphenol, 2,4-	105-67-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0106
Dimethylphenol, 2,4-	105-67-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0118
Dimethylphenol, 2,4-	105-67-9	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0107
Dimethylphenol, 2,4-	105-67-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.05515
Dimethylphenol, 2,4-	105-67-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0124
Dimethylphenol, 2,4-	105-67-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0142
Dimethylphenol, 2,4-	105-67-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0107
Dimethylphenol, 2,4-	105-67-9	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dimethylphenol, 2,4-	105-67-9	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-butyl phthalate	84-74-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00887
Di-n-butyl phthalate	84-74-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Di-n-butyl phthalate	84-74-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Di-n-butyl phthalate	84-74-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Di-n-butyl phthalate	84-74-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Di-n-butyl phthalate	84-74-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Di-n-butyl phthalate	84-74-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Di-n-butyl phthalate	84-74-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0087
Di-n-butyl phthalate	84-74-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Di-n-butyl phthalate	84-74-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Di-n-butyl phthalate	84-74-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Di-n-butyl phthalate	84-74-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Di-n-butyl phthalate	84-74-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0451
Di-n-butyl phthalate	84-74-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0101
Di-n-butyl phthalate	84-74-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Di-n-butyl phthalate	84-74-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Di-n-butyl phthalate	84-74-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-butyl phthalate	84-74-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitro-2-methylphenol, 4,6-	534-52-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0413
Dinitro-2-methylphenol, 4,6-	534-52-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.04
Dinitro-2-methylphenol, 4,6-	534-52-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0492
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0421
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0488
Dinitro-2-methylphenol, 4,6-	534-52-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0389
Dinitro-2-methylphenol, 4,6-	534-52-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0461
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0405
Dinitro-2-methylphenol, 4,6-	534-52-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.238
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0403
Dinitro-2-methylphenol, 4,6-	534-52-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.045
Dinitro-2-methylphenol, 4,6-	534-52-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0407
Dinitro-2-methylphenol, 4,6-	534-52-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.21
Dinitro-2-methylphenol, 4,6-	534-52-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0471
Dinitro-2-methylphenol, 4,6-	534-52-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.054
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0406
Dinitro-2-methylphenol, 4,6-	534-52-1	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitro-2-methylphenol, 4,6-	534-52-1	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitrobenzene, 1,3-	99-65-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrobenzene, 1,3-	99-65-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrobenzene, 1,3-	99-65-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrobenzene, 1,3-	99-65-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrobenzene, 1,3-	99-65-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrobenzene, 1,3-	99-65-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrobenzene, 1,3-	99-65-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrobenzene, 1,3-	99-65-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Dinitrobenzene, 1,3-	99-65-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrobenzene, 1,3-	99-65-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrobenzene, 1,3-	99-65-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrobenzene, 1,3-	99-65-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Dinitrobenzene, 1,3-	99-65-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrobenzene, 1,3-	99-65-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrobenzene, 1,3-	99-65-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrophenol, 2,4-	51-28-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0654

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dinitrophenol, 2,4-	51-28-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0635
Dinitrophenol, 2,4-	51-28-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0781
Dinitrophenol, 2,4-	51-28-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0668
Dinitrophenol, 2,4-	51-28-5	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0773
Dinitrophenol, 2,4-	51-28-5	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0616
Dinitrophenol, 2,4-	51-28-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0731
Dinitrophenol, 2,4-	51-28-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.06415
Dinitrophenol, 2,4-	51-28-5	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.378
Dinitrophenol, 2,4-	51-28-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0639
Dinitrophenol, 2,4-	51-28-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0714
Dinitrophenol, 2,4-	51-28-5	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0644
Dinitrophenol, 2,4-	51-28-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.3325
Dinitrophenol, 2,4-	51-28-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0746
Dinitrophenol, 2,4-	51-28-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0855
Dinitrophenol, 2,4-	51-28-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0643
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Dinitrophenol, 2,4-	51-28-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Dinitrotoluene, 2,4-	121-14-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0144
Dinitrotoluene, 2,4-	121-14-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,4-	121-14-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrotoluene, 2,4-	121-14-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.014
Dinitrotoluene, 2,4-	121-14-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0172
Dinitrotoluene, 2,4-	121-14-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,4-	121-14-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0147
Dinitrotoluene, 2,4-	121-14-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrotoluene, 2,4-	121-14-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.017
Dinitrotoluene, 2,4-	121-14-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,4-	121-14-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrotoluene, 2,4-	121-14-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0136
Dinitrotoluene, 2,4-	121-14-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0161
Dinitrotoluene, 2,4-	121-14-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,4-	121-14-2	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0881
Dinitrotoluene, 2,4-	121-14-2	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.08355
Dinitrotoluene, 2,4-	121-14-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0833
Dinitrotoluene, 2,4-	121-14-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,4-	121-14-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrotoluene, 2,4-	121-14-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0141
Dinitrotoluene, 2,4-	121-14-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0157
Dinitrotoluene, 2,4-	121-14-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,4-	121-14-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrotoluene, 2,4-	121-14-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0142
Dinitrotoluene, 2,4-	121-14-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	39791	0	1	UU	0.11295
Dinitrotoluene, 2,4-	121-14-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0164
Dinitrotoluene, 2,4-	121-14-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrotoluene, 2,4-	121-14-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0188
Dinitrotoluene, 2,4-	121-14-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,4-	121-14-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0142
Dinitrotoluene, 2,4-	121-14-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrotoluene, 2,4-	121-14-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.10585
Dinitrotoluene, 2,4-	121-14-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,4-	121-14-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dinitrotoluene, 2,4-	121-14-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,4-	121-14-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Dinitrotoluene, 2,6-	606-20-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00986
Dinitrotoluene, 2,6-	606-20-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Dinitrotoluene, 2,6-	606-20-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Dinitrotoluene, 2,6-	606-20-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00956
Dinitrotoluene, 2,6-	606-20-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0118
Dinitrotoluene, 2,6-	606-20-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Dinitrotoluene, 2,6-	606-20-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0101
Dinitrotoluene, 2,6-	606-20-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Dinitrotoluene, 2,6-	606-20-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0116
Dinitrotoluene, 2,6-	606-20-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Dinitrotoluene, 2,6-	606-20-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Dinitrotoluene, 2,6-	606-20-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00928
Dinitrotoluene, 2,6-	606-20-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.011
Dinitrotoluene, 2,6-	606-20-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Dinitrotoluene, 2,6-	606-20-2	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	39791	3	4	UU	0.08584
Dinitrotoluene, 2,6-	606-20-2	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.08133

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dinitrotoluene, 2,6-	606-20-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.057
Dinitrotoluene, 2,6-	606-20-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Dinitrotoluene, 2,6-	606-20-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Dinitrotoluene, 2,6-	606-20-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00963
Dinitrotoluene, 2,6-	606-20-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0108
Dinitrotoluene, 2,6-	606-20-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Dinitrotoluene, 2,6-	606-20-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Dinitrotoluene, 2,6-	606-20-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00971
Dinitrotoluene, 2,6-	606-20-2	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1011
Dinitrotoluene, 2,6-	606-20-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0112
Dinitrotoluene, 2,6-	606-20-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Dinitrotoluene, 2,6-	606-20-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0129
Dinitrotoluene, 2,6-	606-20-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Dinitrotoluene, 2,6-	606-20-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00969
Dinitrotoluene, 2,6-	606-20-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Dinitrotoluene, 2,6-	606-20-2	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0945
Dinitrotoluene, 2,6-	606-20-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,6-	606-20-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Dinitrotoluene, 2,6-	606-20-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Dinitrotoluene, 2,6-	606-20-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Dinitrotoluene, 2,6-	606-20-2	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Di-n-octyl phthalate	117-84-0	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0773
Di-n-octyl phthalate	117-84-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0749
Di-n-octyl phthalate	117-84-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0922
Di-n-octyl phthalate	117-84-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0789
Di-n-octyl phthalate	117-84-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0912
Di-n-octyl phthalate	117-84-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0728
Di-n-octyl phthalate	117-84-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0863
Di-n-octyl phthalate	117-84-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.07575
Di-n-octyl phthalate	117-84-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.446
Di-n-octyl phthalate	117-84-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0755
Di-n-octyl phthalate	117-84-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0843
Di-n-octyl phthalate	117-84-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0761
Di-n-octyl phthalate	117-84-0	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.393
Di-n-octyl phthalate	117-84-0	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0881
Di-n-octyl phthalate	117-84-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.101
Di-n-octyl phthalate	117-84-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.076
Di-n-octyl phthalate	117-84-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Di-n-octyl phthalate	117-84-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
DIPHENYLAMINE	122-39-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0407
DIPHENYLAMINE	122-39-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0394
DIPHENYLAMINE	122-39-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0485
DIPHENYLAMINE	122-39-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0415
DIPHENYLAMINE	122-39-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.048
DIPHENYLAMINE	122-39-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0383
DIPHENYLAMINE	122-39-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0454
DIPHENYLAMINE	122-39-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0399
DIPHENYLAMINE	122-39-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.235
DIPHENYLAMINE	122-39-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0397
DIPHENYLAMINE	122-39-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0444
DIPHENYLAMINE	122-39-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.04
DIPHENYLAMINE	122-39-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.2065
DIPHENYLAMINE	122-39-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0464
DIPHENYLAMINE	122-39-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0531
DIPHENYLAMINE	122-39-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.04
Fluoranthene	206-44-0	0.0477	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.00887
Fluoranthene	206-44-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0086
Fluoranthene	206-44-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0106
Fluoranthene	206-44-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00906
Fluoranthene	206-44-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0105
Fluoranthene	206-44-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00836
Fluoranthene	206-44-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00991
Fluoranthene	206-44-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0087
Fluoranthene	206-44-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0513
Fluoranthene	206-44-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00867
Fluoranthene	206-44-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00968
Fluoranthene	206-44-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00874
Fluoranthene	206-44-0	1.875	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.0451
Fluoranthene	206-44-0	0.126	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0101
Fluoranthene	206-44-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Fluoranthene	206-44-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00872
Fluoranthene	206-44-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluoranthene	206-44-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Fluoranthene	206-44-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluoranthene	206-44-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Fluorene	86-73-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0174
Fluorene	86-73-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0169
Fluorene	86-73-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0207
Fluorene	86-73-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0177
Fluorene	86-73-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0205
Fluorene	86-73-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0164
Fluorene	86-73-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Fluorene	86-73-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.01705
Fluorene	86-73-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.1
Fluorene	86-73-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.017
Fluorene	86-73-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.019
Fluorene	86-73-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0171
Fluorene	86-73-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.08835
Fluorene	86-73-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0198
Fluorene	86-73-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0227
Fluorene	86-73-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0171
Fluorene	86-73-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Fluorene	86-73-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Fluorene	86-73-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Fluorene	86-73-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobenzene	118-74-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0255
Hexachlorobenzene	118-74-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0247
Hexachlorobenzene	118-74-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0304
Hexachlorobenzene	118-74-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.026
Hexachlorobenzene	118-74-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0301
Hexachlorobenzene	118-74-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.024
Hexachlorobenzene	118-74-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Hexachlorobenzene	118-74-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.025
Hexachlorobenzene	118-74-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.147
Hexachlorobenzene	118-74-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0249
Hexachlorobenzene	118-74-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0278
Hexachlorobenzene	118-74-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0251
Hexachlorobenzene	118-74-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.13
Hexachlorobenzene	118-74-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0291
Hexachlorobenzene	118-74-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0333
Hexachlorobenzene	118-74-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0251
Hexachlorobenzene	118-74-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobenzene	118-74-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobenzene	118-74-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorobutadiene	87-68-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0389
Hexachlorobutadiene	87-68-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0378
Hexachlorobutadiene	87-68-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0465
Hexachlorobutadiene	87-68-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0397
Hexachlorobutadiene	87-68-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.046
Hexachlorobutadiene	87-68-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0367
Hexachlorobutadiene	87-68-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Hexachlorobutadiene	87-68-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0382
Hexachlorobutadiene	87-68-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.225
Hexachlorobutadiene	87-68-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.038
Hexachlorobutadiene	87-68-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0425
Hexachlorobutadiene	87-68-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0383
Hexachlorobutadiene	87-68-3	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.198
Hexachlorobutadiene	87-68-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0444
Hexachlorobutadiene	87-68-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0509
Hexachlorobutadiene	87-68-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0383
Hexachlorobutadiene	87-68-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorobutadiene	87-68-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorobutadiene	87-68-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachlorocyclopentadiene	77-47-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0131
Hexachlorocyclopentadiene	77-47-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0127

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Hexachlorocyclopentadiene	77-47-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0156
Hexachlorocyclopentadiene	77-47-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0133
Hexachlorocyclopentadiene	77-47-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0154
Hexachlorocyclopentadiene	77-47-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0123
Hexachlorocyclopentadiene	77-47-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
Hexachlorocyclopentadiene	77-47-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0128
Hexachlorocyclopentadiene	77-47-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0755
Hexachlorocyclopentadiene	77-47-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0128
Hexachlorocyclopentadiene	77-47-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0142
Hexachlorocyclopentadiene	77-47-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0129
Hexachlorocyclopentadiene	77-47-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.06645
Hexachlorocyclopentadiene	77-47-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0149
Hexachlorocyclopentadiene	77-47-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0171
Hexachlorocyclopentadiene	77-47-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0128
Hexachlorocyclopentadiene	77-47-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachlorocyclopentadiene	77-47-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Hexachloroethane	67-72-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0126
Hexachloroethane	67-72-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0122
Hexachloroethane	67-72-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.015
Hexachloroethane	67-72-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0128
Hexachloroethane	67-72-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0148
Hexachloroethane	67-72-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0118
Hexachloroethane	67-72-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.014
Hexachloroethane	67-72-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0123
Hexachloroethane	67-72-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0726
Hexachloroethane	67-72-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0123
Hexachloroethane	67-72-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0137
Hexachloroethane	67-72-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0124
Hexachloroethane	67-72-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0639
Hexachloroethane	67-72-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0143
Hexachloroethane	67-72-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0164
Hexachloroethane	67-72-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0124
Hexachloroethane	67-72-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Hexachloroethane	67-72-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Hexachloroethane	67-72-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Hexachloroethane	67-72-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
HMX	2691-41-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
HMX	2691-41-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
HMX	2691-41-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
HMX	2691-41-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
HMX	2691-41-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
HMX	2691-41-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
HMX	2691-41-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
HMX	2691-41-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
HMX	2691-41-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
HMX	2691-41-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
HMX	2691-41-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
HMX	2691-41-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
HMX	2691-41-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
HMX	2691-41-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
HMX	2691-41-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
HMX	2691-41-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Indeno(1,2,3-cd)pyrene	193-39-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.133
Indeno(1,2,3-cd)pyrene	193-39-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.129
Indeno(1,2,3-cd)pyrene	193-39-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.159
Indeno(1,2,3-cd)pyrene	193-39-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.136
Indeno(1,2,3-cd)pyrene	193-39-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.157
Indeno(1,2,3-cd)pyrene	193-39-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.125
Indeno(1,2,3-cd)pyrene	193-39-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.149
Indeno(1,2,3-cd)pyrene	193-39-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.1305
Indeno(1,2,3-cd)pyrene	193-39-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.769
Indeno(1,2,3-cd)pyrene	193-39-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.13
Indeno(1,2,3-cd)pyrene	193-39-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.145
Indeno(1,2,3-cd)pyrene	193-39-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.131
Indeno(1,2,3-cd)pyrene	193-39-5	1.815	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.677
Indeno(1,2,3-cd)pyrene	193-39-5	0.312	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.152
Indeno(1,2,3-cd)pyrene	193-39-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.174
Indeno(1,2,3-cd)pyrene	193-39-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.131
Indeno(1,2,3-cd)pyrene	193-39-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Indeno(1,2,3-cd)pyrene	193-39-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Iron	7439-89-6	17200	mg/kg	3.97		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	B	1.99
Iron	7439-89-6	15600	mg/kg	3.31		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	B	1.65
Iron	7439-89-6	36500	mg/kg	4.61		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	B	2.3
Iron	7439-89-6	21500	mg/kg	3.44		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	B	1.72
Iron	7439-89-6	63100	mg/kg	20.9		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		10.5
Iron	7439-89-6	10600	mg/kg	3.92		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.96
Iron	7439-89-6	90300	mg/kg	20.5		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		10.2
Iron	7439-89-6	23050	mg/kg	5.605		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		2.805
Iron	7439-89-6	64800	mg/kg	20.6		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		10.3
Iron	7439-89-6	62000	mg/kg	19.6		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		9.78
Iron	7439-89-6	41100	mg/kg	4.54		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	B	2.27
Iron	7439-89-6	22600	mg/kg	3.61		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	B	1.81
Iron	7439-89-6	46500	mg/kg	12.855		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		6.44
Iron	7439-89-6	47000	mg/kg	7.75		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		3.87
Iron	7439-89-6	26500	mg/kg	4.84		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	B	2.42
Iron	7439-89-6	20600	mg/kg	3.35		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	B	1.68
Iron	7439-89-6	21600	mg/kg	14.15		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		14.15
Iron	7439-89-6	95100	mg/kg	26.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		26.2
Iron	7439-89-6	29000	mg/kg	16.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		16.7
Iron	7439-89-6	45500	mg/kg	12.6		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		12.6
Iron	7439-89-6	70300	mg/kg	13		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		13
Iron	7439-89-6	73200	mg/kg	24.4		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		24.4
Isophorone	78-59-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Isophorone	78-59-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Isophorone	78-59-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Isophorone	78-59-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Isophorone	78-59-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Isophorone	78-59-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Isophorone	78-59-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Isophorone	78-59-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.004835
Isophorone	78-59-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Isophorone	78-59-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Isophorone	78-59-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Isophorone	78-59-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Isophorone	78-59-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.02505
Isophorone	78-59-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Isophorone	78-59-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Isophorone	78-59-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Isophorone	78-59-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Isophorone	78-59-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Isophorone	78-59-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Isophorone	78-59-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Lead	7439-92-1	6.61	mg/kg	0.46		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.23
Lead	7439-92-1	12.3	mg/kg	0.514		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.257
Lead	7439-92-1	9.65	mg/kg	0.595		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.297
Lead	7439-92-1	14.6	mg/kg	0.479		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.239
Lead	7439-92-1	9.59	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Lead	7439-92-1	7.75	mg/kg	0.449		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.224
Lead	7439-92-1	11.3	mg/kg	0.531		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.266
Lead	7439-92-1	7.69	mg/kg	0.423		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.2115
Lead	7439-92-1	12.3	mg/kg	0.551		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.276
Lead	7439-92-1	5.69	mg/kg	0.481		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.241
Lead	7439-92-1	8.3	mg/kg	0.577		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.288
Lead	7439-92-1	12.2	mg/kg	0.455		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.227
Lead	7439-92-1	27.05	mg/kg	0.476		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.2375
Lead	7439-92-1	9.36	mg/kg	0.531		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.265
Lead	7439-92-1	6.28	mg/kg	0.61		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.305
Lead	7439-92-1	9	mg/kg	0.467		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.233
Lead	7439-92-1	8.3	mg/kg	0.42		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		0.42
Lead	7439-92-1	5.9	mg/kg	0.79		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		0.79
Lead	7439-92-1	8.1	mg/kg	0.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.5
Lead	7439-92-1	10.9	mg/kg	0.38		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.38
Lead	7439-92-1	4.9	mg/kg	0.39		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.39
Lead	7439-92-1	5.6	mg/kg	0.73		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		0.73
Magnesium	7439-95-4	5030	mg/kg	1.99		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.993
Magnesium	7439-95-4	13700	mg/kg	1.65		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.826
Magnesium	7439-95-4	5830	mg/kg	2.3		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.15
Magnesium	7439-95-4	16500	mg/kg	1.72		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.861

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Magnesium	7439-95-4	1500	mg/kg	2.09		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.05
Magnesium	7439-95-4	6420	mg/kg	1.96		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.98
Magnesium	7439-95-4	782	mg/kg	2.05		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.02
Magnesium	7439-95-4	1085	mg/kg	1.885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.9425
Magnesium	7439-95-4	4010	mg/kg	2.06		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.03
Magnesium	7439-95-4	961	mg/kg	1.96		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.978
Magnesium	7439-95-4	1730	mg/kg	2.27		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.13
Magnesium	7439-95-4	11700	mg/kg	1.81		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.903
Magnesium	7439-95-4	1915	mg/kg	1.9		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.9535
Magnesium	7439-95-4	839	mg/kg	1.94		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.969
Magnesium	7439-95-4	3740	mg/kg	2.42		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.21
Magnesium	7439-95-4	16100	mg/kg	1.68		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.838
Magnesium	7439-95-4	1660	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		707
Magnesium	7439-95-4	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Magnesium	7439-95-4	1470	mg/kg	835		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		835
Magnesium	7439-95-4	4910	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Magnesium	7439-95-4	651	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Magnesium	7439-95-4	3770	mg/kg	1220		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1220
Manganese	7439-96-5	263	mg/kg	0.199		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Manganese	7439-96-5	251	mg/kg	0.165		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Manganese	7439-96-5	306	mg/kg	0.23		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Manganese	7439-96-5	543	mg/kg	0.172		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Manganese	7439-96-5	252	mg/kg	0.209		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Manganese	7439-96-5	266	mg/kg	0.196		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Manganese	7439-96-5	241	mg/kg	0.205		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Manganese	7439-96-5	1055.5	mg/kg	0.1885		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.09425
Manganese	7439-96-5	305	mg/kg	0.206		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Manganese	7439-96-5	954	mg/kg	0.196		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Manganese	7439-96-5	199	mg/kg	0.227		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Manganese	7439-96-5	701	mg/kg	0.181		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Manganese	7439-96-5	342	mg/kg	0.19		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.09535
Manganese	7439-96-5	469	mg/kg	0.194		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Manganese	7439-96-5	2810	mg/kg	0.242		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Manganese	7439-96-5	506	mg/kg	0.168		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Manganese	7439-96-5	825	mg/kg	2.15	J	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		2.15
Manganese	7439-96-5	199	mg/kg	3.9		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		3.9
Manganese	7439-96-5	125	mg/kg	2.5		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		2.5
Manganese	7439-96-5	409	mg/kg	1.9		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		1.9
Manganese	7439-96-5	181	mg/kg	1.9		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		1.9
Manganese	7439-96-5	1370	mg/kg	3.7		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		3.7
Mercury	7439-97-6	0.0123	mg/kg	0.0246	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.0123
Mercury	7439-97-6	0.0121	mg/kg	0.0241	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.012
Mercury	7439-97-6	0.0357	mg/kg	0.03		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.015
Mercury	7439-97-6	0.0196	mg/kg	0.0242	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.0121
Mercury	7439-97-6	0.0928	mg/kg	0.0296		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.0148
Mercury	7439-97-6	0.0116	mg/kg	0.0232	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.0116
Mercury	7439-97-6	0.383	mg/kg	0.0274		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.0137
Mercury	7439-97-6	0.0303	mg/kg	0.02295		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.01145
Mercury	7439-97-6	0.0756	mg/kg	0.0291		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.0146
Mercury	7439-97-6	0.0592	mg/kg	0.0224		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0112
Mercury	7439-97-6	0.0146	mg/kg	0.0248	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	J	0.0124
Mercury	7439-97-6	0.0118	mg/kg	0.0236	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.0118
Mercury	7439-97-6	0.157	mg/kg	0.02555		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.0128
Mercury	7439-97-6	0.0516	mg/kg	0.0265		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0133
Mercury	7439-97-6	0.0383	mg/kg	0.0323		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.0162
Mercury	7439-97-6	0.0124	mg/kg	0.0212	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	J	0.0106
Mercury	7439-97-6	0.07	mg/kg	0.14	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	0.14
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.085	mg/kg	0.17	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.17
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.13
Mercury	7439-97-6	0.065	mg/kg	0.13	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.13
Mercury	7439-97-6	0.12	mg/kg	0.24	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	0.24
Methylnaphthalene, 2-	91-57-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.108
Methylnaphthalene, 2-	91-57-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.104
Methylnaphthalene, 2-	91-57-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.128
Methylnaphthalene, 2-	91-57-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.11
Methylnaphthalene, 2-	91-57-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.127
Methylnaphthalene, 2-	91-57-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.101
Methylnaphthalene, 2-	91-57-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.12
Methylnaphthalene, 2-	91-57-6	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.106
Methylnaphthalene, 2-	91-57-6	0.942	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.622
Methylnaphthalene, 2-	91-57-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.105
Methylnaphthalene, 2-	91-57-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.117
Methylnaphthalene, 2-	91-57-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.106
Methylnaphthalene, 2-	91-57-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.548

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Methylnaphthalene, 2-	91-57-6	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.123
Methylnaphthalene, 2-	91-57-6	0.363	mg/kg	0.536	QJ	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.141
Methylnaphthalene, 2-	91-57-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.106
Methylnaphthalene, 2-	91-57-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylnaphthalene, 2-	91-57-6	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 2-	95-48-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00616
Methylphenol, 2-	95-48-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00598
Methylphenol, 2-	95-48-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00735
Methylphenol, 2-	95-48-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00629
Methylphenol, 2-	95-48-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00728
Methylphenol, 2-	95-48-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0058
Methylphenol, 2-	95-48-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00688
Methylphenol, 2-	95-48-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.006045
Methylphenol, 2-	95-48-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0356
Methylphenol, 2-	95-48-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00602
Methylphenol, 2-	95-48-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00672
Methylphenol, 2-	95-48-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00607
Methylphenol, 2-	95-48-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0313
Methylphenol, 2-	95-48-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00703
Methylphenol, 2-	95-48-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00805
Methylphenol, 2-	95-48-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00606
Methylphenol, 2-	95-48-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 2-	95-48-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 2-	95-48-7	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Methylphenol, 4-	106-44-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0128
Methylphenol, 4-	106-44-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0124
Methylphenol, 4-	106-44-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0153
Methylphenol, 4-	106-44-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0131
Methylphenol, 4-	106-44-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0151
Methylphenol, 4-	106-44-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0121
Methylphenol, 4-	106-44-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0143
Methylphenol, 4-	106-44-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0126
Methylphenol, 4-	106-44-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.074
Methylphenol, 4-	106-44-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0125
Methylphenol, 4-	106-44-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.014
Methylphenol, 4-	106-44-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0126
Methylphenol, 4-	106-44-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.06515
Methylphenol, 4-	106-44-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0146
Methylphenol, 4-	106-44-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0167
Methylphenol, 4-	106-44-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0126
Methylphenol, 4-	106-44-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Methylphenol, 4-	106-44-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Methylphenol, 4-	106-44-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Methylphenol, 4-	106-44-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Naphthalene	91-20-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00974
Naphthalene	91-20-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00944
Naphthalene	91-20-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0116
Naphthalene	91-20-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00994
Naphthalene	91-20-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0115
Naphthalene	91-20-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00917
Naphthalene	91-20-3	0.0661	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0109
Naphthalene	91-20-3	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00955
Naphthalene	91-20-3	0.764	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0562
Naphthalene	91-20-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00951
Naphthalene	91-20-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0106
Naphthalene	91-20-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00959
Naphthalene	91-20-3	0.6595	mg/kg	2.085	JU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JU	0.0495
Naphthalene	91-20-3	0.0553	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0111
Naphthalene	91-20-3	0.247	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.0127
Naphthalene	91-20-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00957
Naphthalene	91-20-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Naphthalene	91-20-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Naphthalene	91-20-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Naphthalene	91-20-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Nickel	7440-02-0	3.93	mg/kg	0.298	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.149
Nickel	7440-02-0	13.3	mg/kg	0.248	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.124
Nickel	7440-02-0	0.173	mg/kg	0.346	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.173
Nickel	7440-02-0	18.7	mg/kg	0.258	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.129
Nickel	7440-02-0	0.157	mg/kg	0.314	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.157
Nickel	7440-02-0	1.71	mg/kg	0.294		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.147
Nickel	7440-02-0	0.1535	mg/kg	0.307	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.153
Nickel	7440-02-0	11.66	mg/kg	0.2825		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.1415
Nickel	7440-02-0	0.1545	mg/kg	0.309	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.155
Nickel	7440-02-0	0.1465	mg/kg	0.293	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.147
Nickel	7440-02-0	0.17	mg/kg	0.34	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.17
Nickel	7440-02-0	23.7	mg/kg	0.271	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.135
Nickel	7440-02-0	0.1428	mg/kg	0.2855	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1	UU	0.143
Nickel	7440-02-0	0.1455	mg/kg	0.291	U	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.145
Nickel	7440-02-0	0.1815	mg/kg	0.363	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.181
Nickel	7440-02-0	13.5	mg/kg	0.251	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.126
Nickel	7440-02-0	28.7	mg/kg	5.65		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		5.65
Nickel	7440-02-0	16.1	mg/kg	5.2		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	21.1	mg/kg	6.7		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		6.7
Nickel	7440-02-0	44.3	mg/kg	5.1		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		5.1
Nickel	7440-02-0	16.7	mg/kg	5.2		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		5.2
Nickel	7440-02-0	79.2	mg/kg	9.8		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		9.8
Nitroaniline, 2-	88-74-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0177
Nitroaniline, 2-	88-74-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0172
Nitroaniline, 2-	88-74-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0212
Nitroaniline, 2-	88-74-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0181
Nitroaniline, 2-	88-74-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.021
Nitroaniline, 2-	88-74-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
Nitroaniline, 2-	88-74-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0198
Nitroaniline, 2-	88-74-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0174
Nitroaniline, 2-	88-74-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.103
Nitroaniline, 2-	88-74-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0173
Nitroaniline, 2-	88-74-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0194
Nitroaniline, 2-	88-74-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0175
Nitroaniline, 2-	88-74-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.09025
Nitroaniline, 2-	88-74-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0202
Nitroaniline, 2-	88-74-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0232
Nitroaniline, 2-	88-74-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0174
Nitroaniline, 2-	88-74-4	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitroaniline, 2-	88-74-4	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 2-	88-74-4	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 3-	99-09-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0139
Nitroaniline, 3-	99-09-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0135
Nitroaniline, 3-	99-09-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0166
Nitroaniline, 3-	99-09-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0142
Nitroaniline, 3-	99-09-2	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
Nitroaniline, 3-	99-09-2	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0131
Nitroaniline, 3-	99-09-2	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0155
Nitroaniline, 3-	99-09-2	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.01365
Nitroaniline, 3-	99-09-2	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0804
Nitroaniline, 3-	99-09-2	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0136
Nitroaniline, 3-	99-09-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0152
Nitroaniline, 3-	99-09-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0137
Nitroaniline, 3-	99-09-2	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07085
Nitroaniline, 3-	99-09-2	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0159
Nitroaniline, 3-	99-09-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0182
Nitroaniline, 3-	99-09-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0137
Nitroaniline, 3-	99-09-2	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitroaniline, 3-	99-09-2	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 3-	99-09-2	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitroaniline, 4-	100-01-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.145
Nitroaniline, 4-	100-01-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.141
Nitroaniline, 4-	100-01-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.173
Nitroaniline, 4-	100-01-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.148
Nitroaniline, 4-	100-01-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.172
Nitroaniline, 4-	100-01-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.137
Nitroaniline, 4-	100-01-6	0.229	mg/kg	0.458	UJ	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.162
Nitroaniline, 4-	100-01-6	0.2013	mg/kg	0.4025	UJUJ	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.1425
Nitroaniline, 4-	100-01-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.84

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Nitroaniline, 4-	100-01-6	0.2005	mg/kg	0.401	UJ	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.142
Nitroaniline, 4-	100-01-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.159
Nitroaniline, 4-	100-01-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.143
Nitroaniline, 4-	100-01-6	1.0425	mg/kg	2.085	UJUJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.7395
Nitroaniline, 4-	100-01-6	0.234	mg/kg	0.468	UJ	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.166
Nitroaniline, 4-	100-01-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.19
Nitroaniline, 4-	100-01-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.143
Nitroaniline, 4-	100-01-6	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitroaniline, 4-	100-01-6	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitroaniline, 4-	100-01-6	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitrobenzene	98-95-3	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0134
Nitrobenzene	98-95-3	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrobenzene	98-95-3	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrobenzene	98-95-3	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.013
Nitrobenzene	98-95-3	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.016
Nitrobenzene	98-95-3	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrobenzene	98-95-3	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0137
Nitrobenzene	98-95-3	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrobenzene	98-95-3	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0159
Nitrobenzene	98-95-3	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrobenzene	98-95-3	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrobenzene	98-95-3	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0127
Nitrobenzene	98-95-3	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.015
Nitrobenzene	98-95-3	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrobenzene	98-95-3	0.1818	mg/kg	0.3635	UU	ASH PIT 1-SB04	AP0011AP0011	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0876
Nitrobenzene	98-95-3	0.177	mg/kg	0.354	UU	ASH PIT 1-SB04	AP0012AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0831
Nitrobenzene	98-95-3	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0776
Nitrobenzene	98-95-3	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrobenzene	98-95-3	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrobenzene	98-95-3	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0131
Nitrobenzene	98-95-3	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0147
Nitrobenzene	98-95-3	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrobenzene	98-95-3	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrobenzene	98-95-3	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0132
Nitrobenzene	98-95-3	0.608	mg/kg	1.216	UJU	ASH PIT 1-SB08	AP0023AP0023	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1104
Nitrobenzene	98-95-3	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0153
Nitrobenzene	98-95-3	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrobenzene	98-95-3	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0176
Nitrobenzene	98-95-3	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrobenzene	98-95-3	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0132
Nitrobenzene	98-95-3	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrobenzene	98-95-3	0.5798	mg/kg	1.1595	UJU	ASH PIT 1-SB08	AP0063AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1034
Nitrobenzene	98-95-3	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrobenzene	98-95-3	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Nitrobenzene	98-95-3	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrobenzene	98-95-3	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrophenol, 2-	88-75-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0145
Nitrophenol, 2-	88-75-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0141
Nitrophenol, 2-	88-75-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0173
Nitrophenol, 2-	88-75-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0148
Nitrophenol, 2-	88-75-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0172
Nitrophenol, 2-	88-75-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0137
Nitrophenol, 2-	88-75-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0162
Nitrophenol, 2-	88-75-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.01425
Nitrophenol, 2-	88-75-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.084
Nitrophenol, 2-	88-75-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0142
Nitrophenol, 2-	88-75-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0159
Nitrophenol, 2-	88-75-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0143
Nitrophenol, 2-	88-75-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07395
Nitrophenol, 2-	88-75-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0166
Nitrophenol, 2-	88-75-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.019
Nitrophenol, 2-	88-75-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0143
Nitrophenol, 2-	88-75-5	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Nitrophenol, 2-	88-75-5	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Nitrophenol, 2-	88-75-5	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Nitrophenol, 4-	100-02-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0333
Nitrophenol, 4-	100-02-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0323

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Nitrophenol, 4-	100-02-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0397
Nitrophenol, 4-	100-02-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.034
Nitrophenol, 4-	100-02-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0393
Nitrophenol, 4-	100-02-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0313
Nitrophenol, 4-	100-02-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0372
Nitrophenol, 4-	100-02-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.03265
Nitrophenol, 4-	100-02-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.192
Nitrophenol, 4-	100-02-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0325
Nitrophenol, 4-	100-02-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0363
Nitrophenol, 4-	100-02-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0328
Nitrophenol, 4-	100-02-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1695
Nitrophenol, 4-	100-02-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0379
Nitrophenol, 4-	100-02-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0435
Nitrophenol, 4-	100-02-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0327
Nitrophenol, 4-	100-02-7	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Nitrophenol, 4-	100-02-7	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Nitrophenol, 4-	100-02-7	1	mg/kg	2	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2
Nitrotoluene, 2-	88-72-2	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 2-	88-72-2	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 2-	88-72-2	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 2-	88-72-2	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 2-	88-72-2	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 2-	88-72-2	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 2-	88-72-2	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 2-	88-72-2	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Nitrotoluene, 2-	88-72-2	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 2-	88-72-2	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 2-	88-72-2	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 2-	88-72-2	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 2-	88-72-2	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Nitrotoluene, 2-	88-72-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 2-	88-72-2	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 2-	88-72-2	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrotoluene, 3-	99-08-1	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 3-	99-08-1	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 3-	99-08-1	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 3-	99-08-1	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 3-	99-08-1	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 3-	99-08-1	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 3-	99-08-1	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 3-	99-08-1	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Nitrotoluene, 3-	99-08-1	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 3-	99-08-1	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 3-	99-08-1	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 3-	99-08-1	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 3-	99-08-1	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Nitrotoluene, 3-	99-08-1	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 3-	99-08-1	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 3-	99-08-1	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Nitrotoluene, 4-	99-99-0	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Nitrotoluene, 4-	99-99-0	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Nitrotoluene, 4-	99-99-0	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Nitrotoluene, 4-	99-99-0	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Nitrotoluene, 4-	99-99-0	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Nitrotoluene, 4-	99-99-0	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Nitrotoluene, 4-	99-99-0	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Nitrotoluene, 4-	99-99-0	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Nitrotoluene, 4-	99-99-0	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Nitrotoluene, 4-	99-99-0	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Nitrotoluene, 4-	99-99-0	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Nitrotoluene, 4-	99-99-0	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Nitrotoluene, 4-	99-99-0	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Nitrotoluene, 4-	99-99-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Nitrotoluene, 4-	99-99-0	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Nitrotoluene, 4-	99-99-0	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
n-Nitrosodimethylamine	62-75-9	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0123
n-Nitrosodimethylamine	62-75-9	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.012
n-Nitrosodimethylamine	62-75-9	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0147
n-Nitrosodimethylamine	62-75-9	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0126
n-Nitrosodimethylamine	62-75-9	0.2425	mg/kg	0.485	UJ	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0146
n-Nitrosodimethylamine	62-75-9	0.193	mg/kg	0.386	UJ	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0116
n-Nitrosodimethylamine	62-75-9	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0138

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
n-Nitrosodimethylamine	62-75-9	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0121
n-Nitrosodimethylamine	62-75-9	1.185	mg/kg	2.37	UJ	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0712
n-Nitrosodimethylamine	62-75-9	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.012
n-Nitrosodimethylamine	62-75-9	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0134
n-Nitrosodimethylamine	62-75-9	0.202	mg/kg	0.404	UJ	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0121
n-Nitrosodimethylamine	62-75-9	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0627
n-Nitrosodimethylamine	62-75-9	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0141
n-Nitrosodimethylamine	62-75-9	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0161
n-Nitrosodimethylamine	62-75-9	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0121
n-Nitroso-di-n-propylamine	621-64-7	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0147
n-Nitroso-di-n-propylamine	621-64-7	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0142
n-Nitroso-di-n-propylamine	621-64-7	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0175
n-Nitroso-di-n-propylamine	621-64-7	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.015
n-Nitroso-di-n-propylamine	621-64-7	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0173
n-Nitroso-di-n-propylamine	621-64-7	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0138
n-Nitroso-di-n-propylamine	621-64-7	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0164
n-Nitroso-di-n-propylamine	621-64-7	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0144
n-Nitroso-di-n-propylamine	621-64-7	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0847
n-Nitroso-di-n-propylamine	621-64-7	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0143
n-Nitroso-di-n-propylamine	621-64-7	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.016
n-Nitroso-di-n-propylamine	621-64-7	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0144
n-Nitroso-di-n-propylamine	621-64-7	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.07455
n-Nitroso-di-n-propylamine	621-64-7	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0167
n-Nitroso-di-n-propylamine	621-64-7	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0192
n-Nitroso-di-n-propylamine	621-64-7	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0144
n-Nitroso-di-n-propylamine	621-64-7	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitroso-di-n-propylamine	621-64-7	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
n-Nitrosodiphenylamine	86-30-6	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00579
n-Nitrosodiphenylamine	86-30-6	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00562
n-Nitrosodiphenylamine	86-30-6	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00691
n-Nitrosodiphenylamine	86-30-6	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00591
n-Nitrosodiphenylamine	86-30-6	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00684
n-Nitrosodiphenylamine	86-30-6	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00545
n-Nitrosodiphenylamine	86-30-6	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00647
n-Nitrosodiphenylamine	86-30-6	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00568
n-Nitrosodiphenylamine	86-30-6	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0335
n-Nitrosodiphenylamine	86-30-6	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00566
n-Nitrosodiphenylamine	86-30-6	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00632
n-Nitrosodiphenylamine	86-30-6	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0057
n-Nitrosodiphenylamine	86-30-6	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.02945
n-Nitrosodiphenylamine	86-30-6	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00661
n-Nitrosodiphenylamine	86-30-6	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00757
n-Nitrosodiphenylamine	86-30-6	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00569
n-Nitrosodiphenylamine	86-30-6	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
n-Nitrosodiphenylamine	86-30-6	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Pentachlorophenol	87-86-5	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0369
Pentachlorophenol	87-86-5	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0357
Pentachlorophenol	87-86-5	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.044
Pentachlorophenol	87-86-5	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0376
Pentachlorophenol	87-86-5	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0435
Pentachlorophenol	87-86-5	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0347
Pentachlorophenol	87-86-5	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0411
Pentachlorophenol	87-86-5	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.03615
Pentachlorophenol	87-86-5	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.213
Pentachlorophenol	87-86-5	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.036
Pentachlorophenol	87-86-5	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0402
Pentachlorophenol	87-86-5	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0363
Pentachlorophenol	87-86-5	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.1875
Pentachlorophenol	87-86-5	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.042
Pentachlorophenol	87-86-5	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0482
Pentachlorophenol	87-86-5	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0362
Pentachlorophenol	87-86-5	0.55	mg/kg	1.1	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	1.1
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1.3
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	1
Pentachlorophenol	87-86-5	0.5	mg/kg	1	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	1
Pentachlorophenol	87-86-5	1	mg/kg	2	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	2

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Phenanthrene	85-01-8	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00998
Phenanthrene	85-01-8	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00968
Phenanthrene	85-01-8	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0119
Phenanthrene	85-01-8	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0102
Phenanthrene	85-01-8	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0118
Phenanthrene	85-01-8	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0094
Phenanthrene	85-01-8	0.055	mg/kg	0.458	J	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0111
Phenanthrene	85-01-8	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00979
Phenanthrene	85-01-8	0.275	mg/kg	2.37	J	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	J	0.0577
Phenanthrene	85-01-8	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00975
Phenanthrene	85-01-8	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0109
Phenanthrene	85-01-8	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00983
Phenanthrene	85-01-8	0.831	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.0508
Phenanthrene	85-01-8	0.075	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0114
Phenanthrene	85-01-8	0.156	mg/kg	0.536	J	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	J	0.013
Phenanthrene	85-01-8	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00981
Phenanthrene	85-01-8	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenanthrene	85-01-8	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Phenanthrene	85-01-8	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenanthrene	85-01-8	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Phenol	108-95-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.00493
Phenol	108-95-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.00478
Phenol	108-95-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00588
Phenol	108-95-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.00503
Phenol	108-95-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.00582
Phenol	108-95-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00464
Phenol	108-95-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0055
Phenol	108-95-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.004835
Phenol	108-95-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0285
Phenol	108-95-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00481
Phenol	108-95-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.00538
Phenol	108-95-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00485
Phenol	108-95-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.02505
Phenol	108-95-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00562
Phenol	108-95-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.00644
Phenol	108-95-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00485
Phenol	108-95-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Phenol	108-95-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Phenol	108-95-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Phenol	108-95-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Potassium	7440-09-7	577	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		12.4
Potassium	7440-09-7	1130	mg/kg	20.7	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		10.3
Potassium	7440-09-7	1190	mg/kg	28.8	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		14.4
Potassium	7440-09-7	1110	mg/kg	21.5	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		10.8
Potassium	7440-09-7	1260	mg/kg	26.1		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		13.1
Potassium	7440-09-7	299	mg/kg	24.5		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		12.3
Potassium	7440-09-7	1280	mg/kg	25.6		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		12.8
Potassium	7440-09-7	289.5	mg/kg	23.55		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		11.8
Potassium	7440-09-7	1160	mg/kg	25.8		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		12.9
Potassium	7440-09-7	164	mg/kg	24.4		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		12.2
Potassium	7440-09-7	643	mg/kg	28.4	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		14.2
Potassium	7440-09-7	1580	mg/kg	22.6	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		11.3
Potassium	7440-09-7	654	mg/kg	23.8		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		11.9
Potassium	7440-09-7	559	mg/kg	24.2		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		12.1
Potassium	7440-09-7	1040	mg/kg	30.2	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		15.1
Potassium	7440-09-7	1010	mg/kg	20.9	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		10.5
Potassium	7440-09-7	873.5	mg/kg	707		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		707
Potassium	7440-09-7	1090	mg/kg	654		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		654
Potassium	7440-09-7	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Potassium	7440-09-7	1720	mg/kg	632		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		632
Potassium	7440-09-7	781	mg/kg	648		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		648
Potassium	7440-09-7	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Pyrene	129-00-0	0.0378	mg/kg	0.41	QJ	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	J	0.0164
Pyrene	129-00-0	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0159
Pyrene	129-00-0	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0196
Pyrene	129-00-0	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0167
Pyrene	129-00-0	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0194
Pyrene	129-00-0	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0154
Pyrene	129-00-0	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0183
Pyrene	129-00-0	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0161
Pyrene	129-00-0	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0947

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Pyrene	129-00-0	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.016
Pyrene	129-00-0	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0179
Pyrene	129-00-0	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0161
Pyrene	129-00-0	1.32	mg/kg	2.085	JJ	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	JJ	0.08335
Pyrene	129-00-0	0.102	mg/kg	0.468	J	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	J	0.0187
Pyrene	129-00-0	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0214
Pyrene	129-00-0	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0161
Pyrene	129-00-0	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Pyrene	129-00-0	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Pyrene	129-00-0	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Pyrene	129-00-0	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
RDX	121-82-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
RDX	121-82-4	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
RDX	121-82-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
RDX	121-82-4	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
RDX	121-82-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
RDX	121-82-4	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
RDX	121-82-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
RDX	121-82-4	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
RDX	121-82-4	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
RDX	121-82-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
RDX	121-82-4	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
RDX	121-82-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
RDX	121-82-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
RDX	121-82-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
RDX	121-82-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Selenium	7782-49-2	0.4595	mg/kg	0.919	UJ	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.46
Selenium	7782-49-2	0.515	mg/kg	1.03	UJ	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.514
Selenium	7782-49-2	0.618	mg/kg	1.19	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	J	0.595
Selenium	7782-49-2	0.4785	mg/kg	0.957	UJ	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	U	0.479
Selenium	7782-49-2	0.567	mg/kg	1.05	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	J	0.526
Selenium	7782-49-2	0.449	mg/kg	0.898	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.449
Selenium	7782-49-2	0.6	mg/kg	1.06	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.531
Selenium	7782-49-2	0.4228	mg/kg	0.8455	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4	UU	0.423
Selenium	7782-49-2	0.592	mg/kg	1.1	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.551
Selenium	7782-49-2	0.481	mg/kg	0.962	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.481
Selenium	7782-49-2	0.575	mg/kg	1.15	UJ	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.577
Selenium	7782-49-2	0.4545	mg/kg	0.909	UJ	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.455
Selenium	7782-49-2	0.4973	mg/kg	0.9515	JU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1	JU	0.476
Selenium	7782-49-2	0.559	mg/kg	1.06	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.531
Selenium	7782-49-2	0.61	mg/kg	1.22	UJ	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.61
Selenium	7782-49-2	0.4665	mg/kg	0.933	UJ	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.467
Selenium	7782-49-2	0.665	mg/kg	0.71	/U	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	U	0.71
Selenium	7782-49-2	0.65	mg/kg	1.3	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	1.3
Selenium	7782-49-2	1.2	mg/kg	0.84		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		0.84
Selenium	7782-49-2	0.97	mg/kg	0.63		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		0.63
Selenium	7782-49-2	2.7	mg/kg	0.65		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		0.65
Selenium	7782-49-2	2.6	mg/kg	1.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		1.2
Silver	7440-22-4	0.248	mg/kg	0.496	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.248
Silver	7440-22-4	0.2065	mg/kg	0.413	U	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	U	0.207
Silver	7440-22-4	0.288	mg/kg	0.576	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.288
Silver	7440-22-4	0.2155	mg/kg	0.431	U	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	U	0.215
Silver	7440-22-4	0.2615	mg/kg	0.523	U	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1	U	0.261
Silver	7440-22-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.245
Silver	7440-22-4	0.2555	mg/kg	0.511	U	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	U	0.256
Silver	7440-22-4	0.2358	mg/kg	0.4715	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4	UU	0.2355
Silver	7440-22-4	0.258	mg/kg	0.516	U	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	U	0.258
Silver	7440-22-4	0.2445	mg/kg	0.489	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.244
Silver	7440-22-4	0.2835	mg/kg	0.567	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.284
Silver	7440-22-4	0.2255	mg/kg	0.451	U	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	U	0.226
Silver	7440-22-4	0.238	mg/kg	0.476	UU	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1	UU	0.238
Silver	7440-22-4	0.242	mg/kg	0.484	UJ	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	U	0.242
Silver	7440-22-4	0.3025	mg/kg	0.605	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.302
Silver	7440-22-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.209
Silver	7440-22-4	0.355	mg/kg	0.71	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	0.71
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.42	mg/kg	0.84	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	0.84
Silver	7440-22-4	0.315	mg/kg	0.63	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	0.63
Silver	7440-22-4	0.325	mg/kg	0.65	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	0.65
Silver	7440-22-4	0.6	mg/kg	1.2	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1.2
Sodium	7440-23-5	57.6	mg/kg	9.93		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		4.96
Sodium	7440-23-5	96	mg/kg	8.26		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		4.13
Sodium	7440-23-5	114	mg/kg	11.5		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		5.76

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUF	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Sodium	7440-23-5	131	mg/kg	8.61		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		4.31
Sodium	7440-23-5	96.8	mg/kg	10.5		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		5.23
Sodium	7440-23-5	61.3	mg/kg	9.8		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		4.9
Sodium	7440-23-5	119	mg/kg	10.2		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		5.11
Sodium	7440-23-5	25	mg/kg	9.425		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		4.715
Sodium	7440-23-5	165	mg/kg	10.3		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		5.16
Sodium	7440-23-5	34.9	mg/kg	9.78		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		4.89
Sodium	7440-23-5	70.4	mg/kg	11.3		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		5.67
Sodium	7440-23-5	117	mg/kg	9.03		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		4.51
Sodium	7440-23-5	89.15	mg/kg	9.535	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		4.76
Sodium	7440-23-5	87.4	mg/kg	9.69		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		4.84
Sodium	7440-23-5	161	mg/kg	12.1		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		6.05
Sodium	7440-23-5	111	mg/kg	8.38		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		4.19
Sodium	7440-23-5	353.5	mg/kg	707	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	707
Sodium	7440-23-5	327	mg/kg	654	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U	654
Sodium	7440-23-5	417.5	mg/kg	835	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	835
Sodium	7440-23-5	316	mg/kg	632	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	632
Sodium	7440-23-5	324	mg/kg	648	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	648
Sodium	7440-23-5	610	mg/kg	1220	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	1220
Tetryl	479-45-8	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Tetryl	479-45-8	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Tetryl	479-45-8	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Tetryl	479-45-8	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Tetryl	479-45-8	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Tetryl	479-45-8	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Tetryl	479-45-8	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Tetryl	479-45-8	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Tetryl	479-45-8	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Tetryl	479-45-8	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Tetryl	479-45-8	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Tetryl	479-45-8	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Tetryl	479-45-8	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Tetryl	479-45-8	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Tetryl	479-45-8	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Tetryl	479-45-8	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Thallium	7440-28-0	0.23	mg/kg	0.46	U	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5	U	0.23
Thallium	7440-28-0	0.366	mg/kg	0.514	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5	J	0.257
Thallium	7440-28-0	0.2975	mg/kg	0.595	U	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1	U	0.297
Thallium	7440-28-0	0.343	mg/kg	0.479	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8	J	0.239
Thallium	7440-28-0	0.563	mg/kg	0.526		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.263
Thallium	7440-28-0	0.2245	mg/kg	0.449	U	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5	U	0.224
Thallium	7440-28-0	0.356	mg/kg	0.531	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1	J	0.266
Thallium	7440-28-0	0.2115	mg/kg	0.423	UU	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4	UU	0.2115
Thallium	7440-28-0	0.303	mg/kg	0.551	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1	J	0.276
Thallium	7440-28-0	0.2405	mg/kg	0.481	U	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7	U	0.241
Thallium	7440-28-0	0.2885	mg/kg	0.577	U	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8	U	0.288
Thallium	7440-28-0	0.239	mg/kg	0.455	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8	J	0.227
Thallium	7440-28-0	0.274	mg/kg	0.476	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1	JJ	0.2375
Thallium	7440-28-0	0.275	mg/kg	0.531	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5	J	0.265
Thallium	7440-28-0	0.305	mg/kg	0.61	U	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1	U	0.305
Thallium	7440-28-0	0.2335	mg/kg	0.467	U	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4	U	0.233
Thallium	7440-28-0	0.7	mg/kg	1.4	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	UU	1.4
Thallium	7440-28-0	1.3	mg/kg	2.6	U,G	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	U,G	2.6
Thallium	7440-28-0	0.85	mg/kg	1.7	U	PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	U	1.7
Thallium	7440-28-0	0.65	mg/kg	1.3	U	PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	U	1.3
Thallium	7440-28-0	0.65	mg/kg	1.3	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	U	1.3
Thallium	7440-28-0	1.2	mg/kg	2.4	U	PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	U	2.4
Total organic carbon	10-35-5	55.3	mg/kg	24.8	J	ASH PIT 1-SB01	AP0001	TOC-W	REG	8-Dec-08	0.5	1.5	B	0.62
Total organic carbon	10-35-5	65	mg/kg	130	U	PBOW99-SBA102A	PBOW99SBA102A	TOC	REG	10-Jun-99	0	1	U	130
Total organic carbon	10-35-5	1900	mg/kg	130		PBOW99-SBA103B	PBOW99SBA103B	TOC	REG	10-Jun-99	1	4		130
Trichlorobenzene, 1,2,4-	120-82-1	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0101
Trichlorobenzene, 1,2,4-	120-82-1	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0098
Trichlorobenzene, 1,2,4-	120-82-1	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0121
Trichlorobenzene, 1,2,4-	120-82-1	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0103
Trichlorobenzene, 1,2,4-	120-82-1	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0119
Trichlorobenzene, 1,2,4-	120-82-1	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.00952
Trichlorobenzene, 1,2,4-	120-82-1	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0113
Trichlorobenzene, 1,2,4-	120-82-1	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.00991
Trichlorobenzene, 1,2,4-	120-82-1	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0584
Trichlorobenzene, 1,2,4-	120-82-1	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.00987
Trichlorobenzene, 1,2,4-	120-82-1	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.011
Trichlorobenzene, 1,2,4-	120-82-1	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.00995
Trichlorobenzene, 1,2,4-	120-82-1	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.0514
Trichlorobenzene, 1,2,4-	120-82-1	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0115
Trichlorobenzene, 1,2,4-	120-82-1	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0132

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Trichlorobenzene, 1,2,4-	120-82-1	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.00993
Trichlorobenzene, 1,2,4-	120-82-1	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorobenzene, 1,2,4-	120-82-1	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.405	mg/kg	0.81	U	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorophenol, 2,4,5-	95-95-4	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0352
Trichlorophenol, 2,4,5-	95-95-4	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0342
Trichlorophenol, 2,4,5-	95-95-4	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.042
Trichlorophenol, 2,4,5-	95-95-4	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.036
Trichlorophenol, 2,4,5-	95-95-4	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0416
Trichlorophenol, 2,4,5-	95-95-4	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0332
Trichlorophenol, 2,4,5-	95-95-4	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0394
Trichlorophenol, 2,4,5-	95-95-4	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.03455
Trichlorophenol, 2,4,5-	95-95-4	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.204
Trichlorophenol, 2,4,5-	95-95-4	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0344
Trichlorophenol, 2,4,5-	95-95-4	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0384
Trichlorophenol, 2,4,5-	95-95-4	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0347
Trichlorophenol, 2,4,5-	95-95-4	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.179
Trichlorophenol, 2,4,5-	95-95-4	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0402
Trichlorophenol, 2,4,5-	95-95-4	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0461
Trichlorophenol, 2,4,5-	95-95-4	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0346
Trichlorophenol, 2,4,5-	95-95-4	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,5-	95-95-4	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trichlorophenol, 2,4,6-	88-06-2	0.205	mg/kg	0.41	U	ASH PIT 1-SB01	AP0001	SEMIVOLATILES	REG	8-Dec-08	0.5	1.5	U	0.0277
Trichlorophenol, 2,4,6-	88-06-2	0.199	mg/kg	0.398	U	ASH PIT 1-SB01	AP0002	SEMIVOLATILES	REG	8-Dec-08	3.5	5.5	U	0.0269
Trichlorophenol, 2,4,6-	88-06-2	0.245	mg/kg	0.49	U	ASH PIT 1-SB02	AP0004	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0331
Trichlorophenol, 2,4,6-	88-06-2	0.2095	mg/kg	0.419	U	ASH PIT 1-SB02	AP0005	SEMIVOLATILES	REG	8-Dec-08	3	3.8	U	0.0283
Trichlorophenol, 2,4,6-	88-06-2	0.2425	mg/kg	0.485	U	ASH PIT 1-SB03	AP0007	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.0327
Trichlorophenol, 2,4,6-	88-06-2	0.193	mg/kg	0.386	U	ASH PIT 1-SB03	AP0008	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0261
Trichlorophenol, 2,4,6-	88-06-2	0.229	mg/kg	0.458	U	ASH PIT 1-SB04	AP0010	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.031
Trichlorophenol, 2,4,6-	88-06-2	0.2013	mg/kg	0.4025	UU	ASH PIT 1-SB04	AP0011AP0012	SEMIVOLATILES	AVGD	39791	3	4	UU	0.0272
Trichlorophenol, 2,4,6-	88-06-2	1.185	mg/kg	2.37	U	ASH PIT 1-SB05	AP0014	SEMIVOLATILES	REG	9-Dec-08	0	1	U	0.16
Trichlorophenol, 2,4,6-	88-06-2	0.2005	mg/kg	0.401	U	ASH PIT 1-SB05	AP0015	SEMIVOLATILES	REG	9-Dec-08	3	3.7	U	0.0271
Trichlorophenol, 2,4,6-	88-06-2	0.224	mg/kg	0.448	U	ASH PIT 1-SB06	AP0017	SEMIVOLATILES	REG	8-Dec-08	0.8	1.8	U	0.0302
Trichlorophenol, 2,4,6-	88-06-2	0.202	mg/kg	0.404	U	ASH PIT 1-SB06	AP0018	SEMIVOLATILES	REG	8-Dec-08	5	5.8	U	0.0273
Trichlorophenol, 2,4,6-	88-06-2	1.0425	mg/kg	2.085	UU	ASH PIT 1-SB08	AP0023AP0063	SEMIVOLATILES	AVGD	39791	0	1	UU	0.141
Trichlorophenol, 2,4,6-	88-06-2	0.234	mg/kg	0.468	U	ASH PIT 1-SB08	AP0024	SEMIVOLATILES	REG	9-Dec-08	3	5	U	0.0316
Trichlorophenol, 2,4,6-	88-06-2	0.268	mg/kg	0.536	U	ASH PIT 1-SB09	AP0026	SEMIVOLATILES	REG	8-Dec-08	0	1	U	0.0362
Trichlorophenol, 2,4,6-	88-06-2	0.2015	mg/kg	0.403	U	ASH PIT 1-SB09	AP0027	SEMIVOLATILES	REG	8-Dec-08	3	4	U	0.0273
Trichlorophenol, 2,4,6-	88-06-2	0.2325	mg/kg	0.465	UU	PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	SEMIVOLATILES	AVGD	36322	0	0.5	UU	0.465
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA102A	PBOW99SBA102A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.275	mg/kg	0.55	U	PBOW99-SBA103A	PBOW99SBA103A	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.55
Trichlorophenol, 2,4,6-	88-06-2	0.21	mg/kg	0.42	U	PBOW99-SBA103B	PBOW99SBA103B	SEMIVOLATILES	REG	10-Jun-99	1	4	U	0.42
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.43	U	PBOW99-SBA104B	PBOW99SBA104B	SEMIVOLATILES	REG	10-Jun-99	0	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.405	mg/kg	0.81	UJ	PBOW99-SSA101	PBOW99SSA101	SEMIVOLATILES	REG	10-Jun-99	0	0	U	0.81
Trinitrobenzene, 1,3,5-	99-35-4	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrobenzene, 1,3,5-	99-35-4	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Trinitrobenzene, 1,3,5-	99-35-4	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrobenzene, 1,3,5-	99-35-4	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Trinitrobenzene, 1,3,5-	99-35-4	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrobenzene, 1,3,5-	99-35-4	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Trinitrobenzene, 1,3,5-	99-35-4	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrobenzene, 1,3,5-	99-35-4	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575
Trinitrobenzene, 1,3,5-	99-35-4	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Trinitrobenzene, 1,3,5-	99-35-4	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrobenzene, 1,3,5-	99-35-4	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Trinitrobenzene, 1,3,5-	99-35-4	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Trinitrobenzene, 1,3,5-	99-35-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Trinitrobenzene, 1,3,5-	99-35-4	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Trinitrobenzene, 1,3,5-	99-35-4	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Trinitrotoluene, 2,4,6-	118-96-7	0.158	mg/kg	0.316	UJ	ASH PIT 1-SB01	AP0001	EXPLOSIVES	REG	8-Dec-08	0.5	1.5	U	0.158
Trinitrotoluene, 2,4,6-	118-96-7	0.145	mg/kg	0.29	U	ASH PIT 1-SB01	AP0002	EXPLOSIVES	REG	8-Dec-08	3.5	5.5	U	0.145
Trinitrotoluene, 2,4,6-	118-96-7	0.1495	mg/kg	0.299	UJ	ASH PIT 1-SB02	AP0004	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.149
Trinitrotoluene, 2,4,6-	118-96-7	0.143	mg/kg	0.286	UJ	ASH PIT 1-SB02	AP0005	EXPLOSIVES	REG	8-Dec-08	3	3.8	U	0.143
Trinitrotoluene, 2,4,6-	118-96-7	0.1525	mg/kg	0.305	UJ	ASH PIT 1-SB03	AP0007	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.152
Trinitrotoluene, 2,4,6-	118-96-7	0.148	mg/kg	0.296	U	ASH PIT 1-SB03	AP0008	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.148
Trinitrotoluene, 2,4,6-	118-96-7	0.137	mg/kg	0.274	UJ	ASH PIT 1-SB04	AP0010	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.137
Trinitrotoluene, 2,4,6-	118-96-7	0.1575	mg/kg	0.315	UU	ASH PIT 1-SB04	AP0011AP0012	EXPLOSIVES	AVGD	39791	3	4	UU	0.1575

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Trinitrotoluene, 2,4,6-	118-96-7	0.1595	mg/kg	0.319	UJ	ASH PIT 1-SB05	AP0014	EXPLOSIVES	REG	9-Dec-08	0	1	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.142	mg/kg	0.284	U	ASH PIT 1-SB05	AP0015	EXPLOSIVES	REG	9-Dec-08	3	3.7	U	0.142
Trinitrotoluene, 2,4,6-	118-96-7	0.142	mg/kg	0.284	UJ	ASH PIT 1-SB06	AP0017	EXPLOSIVES	REG	8-Dec-08	0.8	1.8	U	0.142
Trinitrotoluene, 2,4,6-	118-96-7	0.153	mg/kg	0.306	U	ASH PIT 1-SB06	AP0018	EXPLOSIVES	REG	8-Dec-08	5	5.8	U	0.153
Trinitrotoluene, 2,4,6-	118-96-7	0.1453	mg/kg	0.2905	UJUJ	ASH PIT 1-SB08	AP0023AP0063	EXPLOSIVES	AVGD	39791	0	1	UU	0.1455
Trinitrotoluene, 2,4,6-	118-96-7	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB08	AP0024	EXPLOSIVES	REG	9-Dec-08	3	5	U	0.161
Trinitrotoluene, 2,4,6-	118-96-7	0.151	mg/kg	0.302	UJ	ASH PIT 1-SB09	AP0026	EXPLOSIVES	REG	8-Dec-08	0	1	U	0.151
Trinitrotoluene, 2,4,6-	118-96-7	0.1615	mg/kg	0.323	UJ	ASH PIT 1-SB09	AP0027	EXPLOSIVES	REG	8-Dec-08	3	4	U	0.161
Vanadium	7440-62-2	20.7	mg/kg	0.199	J	ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		0.0993
Vanadium	7440-62-2	19.3	mg/kg	0.165	J	ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		0.0826
Vanadium	7440-62-2	26.3	mg/kg	0.23	J	ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		0.115
Vanadium	7440-62-2	20.6	mg/kg	0.172	J	ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		0.0861
Vanadium	7440-62-2	29.9	mg/kg	0.209	J	ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		0.105
Vanadium	7440-62-2	15.1	mg/kg	0.196	J	ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		0.098
Vanadium	7440-62-2	32.4	mg/kg	0.205	J	ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		0.102
Vanadium	7440-62-2	24.05	mg/kg	0.1885	JJ	ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		0.09425
Vanadium	7440-62-2	27.9	mg/kg	0.206	J	ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		0.103
Vanadium	7440-62-2	37.6	mg/kg	0.196	J	ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		0.0978
Vanadium	7440-62-2	28.2	mg/kg	0.227	J	ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		0.113
Vanadium	7440-62-2	24.3	mg/kg	0.181	J	ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		0.0903
Vanadium	7440-62-2	21.85	mg/kg	0.19	JJ	ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		0.09535
Vanadium	7440-62-2	18.9	mg/kg	0.194	J	ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		0.0969
Vanadium	7440-62-2	20.7	mg/kg	0.242	J	ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		0.121
Vanadium	7440-62-2	19.1	mg/kg	0.168	J	ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		0.0838
Vanadium	7440-62-2	20.25	mg/kg	7.1		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5		7.1
Vanadium	7440-62-2	17.8	mg/kg	13.1		PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1		13.1
Vanadium	7440-62-2	39.2	mg/kg	8.4		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1		8.4
Vanadium	7440-62-2	26.8	mg/kg	6.3		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4		6.3
Vanadium	7440-62-2	14.4	mg/kg	6.5		PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1		6.5
Vanadium	7440-62-2	23	mg/kg	12.2		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0		12.2
Zinc	7440-66-6	44.4	mg/kg	2.48		ASH PIT 1-SB01	AP0001	METALS	REG	8-Dec-08	0.5	1.5		1.24
Zinc	7440-66-6	57.1	mg/kg	2.07		ASH PIT 1-SB01	AP0002	METALS	REG	8-Dec-08	3.5	5.5		1.03
Zinc	7440-66-6	55.2	mg/kg	2.88		ASH PIT 1-SB02	AP0004	METALS	REG	8-Dec-08	0	1		1.44
Zinc	7440-66-6	72.7	mg/kg	2.15		ASH PIT 1-SB02	AP0005	METALS	REG	8-Dec-08	3	3.8		1.08
Zinc	7440-66-6	57.1	mg/kg	2.61		ASH PIT 1-SB03	AP0007	METALS	REG	9-Dec-08	0	1		1.31
Zinc	7440-66-6	23.1	mg/kg	2.45		ASH PIT 1-SB03	AP0008	METALS	REG	9-Dec-08	3	5		1.23
Zinc	7440-66-6	55.3	mg/kg	2.56		ASH PIT 1-SB04	AP0010	METALS	REG	9-Dec-08	0	1		1.28
Zinc	7440-66-6	69.25	mg/kg	2.355		ASH PIT 1-SB04	AP0011AP0012	METALS	AVGD	39791	3	4		1.18
Zinc	7440-66-6	62.8	mg/kg	2.58		ASH PIT 1-SB05	AP0014	METALS	REG	9-Dec-08	0	1		1.29
Zinc	7440-66-6	92.4	mg/kg	2.44		ASH PIT 1-SB05	AP0015	METALS	REG	9-Dec-08	3	3.7		1.22
Zinc	7440-66-6	85.4	mg/kg	2.84		ASH PIT 1-SB06	AP0017	METALS	REG	8-Dec-08	0.8	1.8		1.42
Zinc	7440-66-6	67.2	mg/kg	2.26		ASH PIT 1-SB06	AP0018	METALS	REG	8-Dec-08	5	5.8		1.13
Zinc	7440-66-6	63.4	mg/kg	2.38		ASH PIT 1-SB08	AP0023AP0063	METALS	AVGD	39791	0	1		1.19
Zinc	7440-66-6	38.1	mg/kg	2.42		ASH PIT 1-SB08	AP0024	METALS	REG	9-Dec-08	3	5		1.21
Zinc	7440-66-6	34.8	mg/kg	3.02		ASH PIT 1-SB09	AP0026	METALS	REG	8-Dec-08	0	1		1.51
Zinc	7440-66-6	63.3	mg/kg	2.09		ASH PIT 1-SB09	AP0027	METALS	REG	8-Dec-08	3	4		1.05
Zinc	7440-66-6	63.15	mg/kg	2.8		PBOW99-SBA101A	PBOW99SBA101APBOW99SBA101A-DUP	METALS	AVGD	36322	0	0.5	MBDMBD	2.8
Zinc	7440-66-6	2.6	mg/kg	5.2	U	PBOW99-SBA102A	PBOW99SBA102A	METALS	REG	10-Jun-99	0	1	MBD	5.2
Zinc	7440-66-6	43.5	mg/kg	3.3		PBOW99-SBA103A	PBOW99SBA103A	METALS	REG	10-Jun-99	0	1	MBD	3.3
Zinc	7440-66-6	74.5	mg/kg	2.5		PBOW99-SBA103B	PBOW99SBA103B	METALS	REG	10-Jun-99	1	4	MBD	2.5
Zinc	7440-66-6	1.3	mg/kg	2.6	U	PBOW99-SBA104B	PBOW99SBA104B	METALS	REG	10-Jun-99	0	1	MBD	2.6
Zinc	7440-66-6	95.8	mg/kg	4.9		PBOW99-SSA101	PBOW99SSA101	METALS	REG	10-Jun-99	0	0	MBD	4.9

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
3-Methylphenol and 4-Methylpheno	65794-96-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthene	83-32-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Acenaphthylene	208-96-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Aluminum	7429-90-5	31.8	ug/L	200	J	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	11	B	N
Aluminum	7429-90-5	31.9	ug/L	200	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	11	B	N
Aluminum	7429-90-5	83.8	ug/L	200	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	11	B	N
Aluminum	7429-90-5	8770	ug/L	200		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	11		N
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.048	U	N
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.074	U	N
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.073	U	N
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.073	U	N
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.073	U	N
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Anthracene	120-12-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	4.5	U	N
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	4.5	U	N
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	4.5	U	N
Antimony	7440-36-0	3	ug/L	6	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	4.5	U	N
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1016	12674-11-2	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.24	U	N
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1221	11104-28-2	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.38	U	N
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.38	U	N
Aroclor 1232	11141-16-5	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.38	U	N
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1242	53469-21-9	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.24	U	N
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1248	12672-29-6	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.24	U	N
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1254	11097-69-1	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.24	U	N
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW01	AP2007	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW02	AP2008	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW03	AP2012	PEST/PCB	REG	19-May-09	0	0	0.24	U	N
Aroclor 1260	11096-82-5	0.24	ug/L	0.48	U	AP1-SW04	AP2013	PEST/PCB	REG	20-May-09	0	0	0.24	U	N
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	3.6	U	N
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	3.6	U	N
Arsenic	7440-38-2	5	ug/L	10	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	3.6	U	N
Arsenic	7440-38-2	8.3	ug/L	10	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	3.6	B	N
Barium	7440-39-3	31.9	ug/L	200	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	5	B	N
Barium	7440-39-3	33.8	ug/L	200	J	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	5	B	N
Barium	7440-39-3	36.6	ug/L	200	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	5	B	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Barium	7440-39-3	80	ug/L	200	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	5	B	N
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)anthracene	56-55-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(a)pyrene	50-32-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(b)fluoranthene	205-99-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(ghi)perylene	191-24-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzo(k)fluoranthene	207-08-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Benzoic acid	65-85-0	12.5	ug/L	25	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	10	U	N
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Benzyl alcohol	100-51-6	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	1	U	N
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	1	U	N
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	1	U	N
Beryllium	7440-41-7	2	ug/L	4	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	1	U	N
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethoxy)methane	111-91-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroethyl)ether	111-44-4	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bis(2-chloroisopropyl)ether	108-60-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Bis(2-ethylhexyl)phthalate	117-81-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Bromophenyl phenyl ether, 4-	101-55-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Butyl benzyl phthalate	85-68-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	1	U	N
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	1	U	N
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	1	U	N
Cadmium	7440-43-9	2.5	ug/L	5	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	1	U	N
Calcium	7440-70-2	1E+05	ug/L	1000		AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	100		N
Calcium	7440-70-2	1E+05	ug/L	1000		AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	100		N
Calcium	7440-70-2	1E+05	ug/L	1000		AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	100		N
Calcium	7440-70-2	2E+05	ug/L	1000		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	100		N
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Carbazole	86-74-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloro-3-methylphenol, 4-	59-50-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloroaniline, 4-	106-47-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chloronaphthalene, 2-	91-58-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Chlorophenol, 2-	95-57-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.2	U	N
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chlorophenyl phenyl ether, 4-	7005-72-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	1.6	U	N
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	1.6	U	N
Chromium	7440-47-3	5	ug/L	10	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	1.6	U	N
Chromium	7440-47-3	13.9	ug/L	10		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	1.6		N
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Chrysene	218-01-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Cobalt	7440-48-4	6.9	ug/L	50	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	0.83	B	N
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	0.83	U	N
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	0.83	U	N
Cobalt	7440-48-4	25	ug/L	50	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	0.83	U	N
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	2.1	U	N
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	2.1	U	N
Copper	7440-50-8	12.5	ug/L	25	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	2.1	U	N
Copper	7440-50-8	19.2	ug/L	25	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	2.1	B	N
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenz(a,h)anthracene	53-70-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dibenzofuran	132-64-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,2-	95-50-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,3-	541-73-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dichlorobenzene, 1,4-	106-46-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Dichlorophenol, 2,4-	120-83-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.3	U	N
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Diethyl phthalate	84-66-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dimethyl phthalate	131-11-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.2	U	N
Dimethylphenol, 2,4-	105-67-9	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.2	U	N
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Di-n-butyl phthalate	84-74-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	4	U	N
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	4	U	N
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	4	U	N
Dinitro-2-methylphenol, 4,6-	534-52-1	5	ug/L	10	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	4	U	N
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.049	U	N
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.049	U	N
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.049	U	N
Dinitrobenzene, 1,3-	99-65-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.049	U	N
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	10	U	N
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.062	U	N
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.062	U	N
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.062	U	N
Dinitrotoluene, 2,4-	121-14-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.062	U	N
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,4-	121-14-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.089	U	N
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.089	U	N
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.089	U	N
Dinitrotoluene, 2,6-	606-20-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.089	U	N
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Dinitrotoluene, 2,6-	606-20-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.5	U	N
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.5	U	N
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.5	U	N
Di-n-octyl phthalate	117-84-0	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.5	U	N
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluoranthene	206-44-0	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Fluorene	86-73-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Hexachlorobenzene	118-74-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachlorobutadiene	87-68-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2.5	U	N
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Hexachlorocyclopentadiene	77-47-4	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.3	U	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2.5	U	N
Hexachloroethane	67-72-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2.5	U	N
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.1	U	N
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.1	U	N
HMX	2691-41-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.1	U	N
HMX	2691-41-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.1	U	N
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.1	U	N
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.1	U	N
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.1	U	N
Indeno(1,2,3-cd)pyrene	193-39-5	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.1	U	N
Iron	7439-89-6	26.6	ug/L	300	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	23	B	N
Iron	7439-89-6	31.1	ug/L	300	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	23	B	N
Iron	7439-89-6	150	ug/L	300	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	23	U	N
Iron	7439-89-6	15100	ug/L	300		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	23		N
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Isophorone	78-59-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Lead	7439-92-1	2	ug/L	10	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	2	B	N
Lead	7439-92-1	2.1	ug/L	10	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	2	B	N
Lead	7439-92-1	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	2	U	N
Lead	7439-92-1	15	ug/L	10		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	2		N
Magnesium	7439-95-4	26200	ug/L	5000		AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	100		N
Magnesium	7439-95-4	26300	ug/L	5000		AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	100		N
Magnesium	7439-95-4	26600	ug/L	5000		AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	100		N
Magnesium	7439-95-4	36900	ug/L	5000		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	100		N
Manganese	7439-96-5	247	ug/L	15		AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	0.5		N
Manganese	7439-96-5	396	ug/L	15		AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	0.5		N
Manganese	7439-96-5	488	ug/L	15		AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	0.5		N
Manganese	7439-96-5	836	ug/L	15		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	0.5		N
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	0.14	U	N
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	0.14	U	N
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	0.14	U	N
Mercury	7439-97-6	0.5	ug/L	1	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	0.14	U	N
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylnaphthalene, 2-	91-57-6	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Methylphenol, 2-	95-48-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Naphthalene	91-20-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	2.3	U	N
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	2.3	U	N
Nickel	7440-02-0	20	ug/L	40	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	2.3	U	N
Nickel	7440-02-0	26.2	ug/L	40	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	2.3	B	N
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 2-	88-74-4	5	ug/L	10	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 3-	99-09-2	5	ug/L	10	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
Nitroaniline, 4-	100-01-6	5	ug/L	10	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Nitrobenzene	98-95-3	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Nitrobenzene	98-95-3	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.048	U	N
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Nitrobenzene	98-95-3	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.3	U	N
Nitrophenol, 2-	88-75-5	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.3	U	N
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	10	U	N
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.062	U	N
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.061	U	N
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.061	U	N
Nitrotoluene, 2-	88-72-2	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.061	U	N
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.093	U	N
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.092	U	N
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.092	U	N
Nitrotoluene, 3-	99-08-1	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.092	U	N
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.073	U	N
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.072	U	N
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.072	U	N
Nitrotoluene, 4-	99-99-0	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.072	U	N
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
n-Nitroso-di-n-propylamine	621-64-7	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	2	U	N
n-Nitrosodiphenylamine	86-30-6	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	2	U	N
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	10	U	N
Pentachlorophenol	87-86-5	12.5	ug/L	25	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	10	U	N
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenanthrene	85-01-8	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Phenol	108-95-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Potassium	7440-09-7	2030	ug/L	10000	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	100	B	N
Potassium	7440-09-7	2040	ug/L	10000	J	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	100	B	N
Potassium	7440-09-7	2170	ug/L	10000	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	100	B	N
Potassium	7440-09-7	11800	ug/L	10000		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	100		N
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Pyrene	129-00-0	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.072	U	N
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.071	U	N
RDX	121-82-4	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.071	U	N
RDX	121-82-4	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.071	U	N
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	3.1	U	N
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	3.1	U	N
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	3.1	U	N
Selenium	7782-49-2	5	ug/L	10	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	3.1	U	N
Silver	7440-22-4	5	ug/L	10	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	1.2	U	N
Silver	7440-22-4	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	1.2	U	N
Silver	7440-22-4	5	ug/L	10	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	1.2	U	N
Silver	7440-22-4	5	ug/L	10	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	1.2	U	N
Sodium	7440-23-5	6400	ug/L	10000	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	500	B	N
Sodium	7440-23-5	6850	ug/L	10000	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	500	B	N

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM	FILTERED
Sodium	7440-23-5	7050	ug/L	10000	J	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	500	B	N
Sodium	7440-23-5	9140	ug/L	10000	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	500	B	N
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.075	U	N
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.074	U	N
Tetryl	479-45-8	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.074	U	N
Tetryl	479-45-8	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.074	U	N
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	3.4	U	N
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	3.4	U	N
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	3.4	U	N
Thallium	7440-28-0	5	ug/L	10	U	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	3.4	U	N
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1	U	N
Trichlorobenzene, 1,2,4-	120-82-1	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1	U	N
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,5-	95-95-4	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW01	AP2007	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW02	AP2008	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW03	AP2012	SEMIVOLATILES	REG	19-May-09	0	0	1.4	U	N
Trichlorophenol, 2,4,6-	88-06-2	2.5	ug/L	5	U	AP1-SW04	AP2013	SEMIVOLATILES	REG	20-May-09	0	0	1.4	U	N
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.048	U	N
Trinitrobenzene, 1,3,5-	99-35-4	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.048	U	N
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW01	AP2007	EXPLOSIVES	REG	19-May-09	0	0	0.066	U	N
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW02	AP2008	EXPLOSIVES	REG	19-May-09	0	0	0.066	U	N
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	U	AP1-SW03	AP2012	EXPLOSIVES	REG	19-May-09	0	0	0.066	U	N
Trinitrotoluene, 2,4,6-	118-96-7	0.095	ug/L	0.19	UJ	AP1-SW04	AP2013	EXPLOSIVES	REG	20-May-09	0	0	0.066	U	N
Vanadium	7440-62-2	20	ug/L	50	J	AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	0.66	B	N
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	0.66	U	N
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	0.66	U	N
Vanadium	7440-62-2	25	ug/L	50	U	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	0.66	U	N
Zinc	7440-66-6	9.6	ug/L	20	J	AP1-SW02	AP2008	METALS	REG	19-May-09	0	0	3.8	B	N
Zinc	7440-66-6	10.8	ug/L	20	J	AP1-SW03	AP2012	METALS	REG	19-May-09	0	0	3.8	B	N
Zinc	7440-66-6	13.2	ug/L	20	J	AP1-SW01	AP2007	METALS	REG	19-May-09	0	0	3.8	B	N
Zinc	7440-66-6	93.2	ug/L	20		AP1-SW04	AP2013	METALS	REG	20-May-09	0	0	3.8		N

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
3-Methylphenol and 4-Methylphenol	65794-96-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
3-Methylphenol and 4-Methylphenol	65794-96-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
3-Methylphenol and 4-Methylphenol	65794-96-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
3-Methylphenol and 4-Methylphenol	65794-96-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Acenaphthene	83-32-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Acenaphthene	83-32-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Acenaphthene	83-32-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Acenaphthene	83-32-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Acenaphthylene	208-96-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Acenaphthylene	208-96-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Acenaphthylene	208-96-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Acenaphthylene	208-96-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Aluminum	7429-90-5	4490	mg/kg	15		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.82
Aluminum	7429-90-5	7130	mg/kg	13		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.7
Aluminum	7429-90-5	9860	mg/kg	24		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		1.3
Aluminum	7429-90-5	9880	mg/kg	15		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.84
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.044
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.044
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.047
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.048
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.095
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.096
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.1
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.1
Anthracene	120-12-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Anthracene	120-12-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Anthracene	120-12-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Anthracene	120-12-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Antimony	7440-36-0	0.5	mg/kg	4.6	J	AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5	B	0.34
Antimony	7440-36-0	0.7	mg/kg	3.8	J	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	B	0.29
Antimony	7440-36-0	1.3	mg/kg	7.3	J	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	B	0.54
Antimony	7440-36-0	2.25	mg/kg	4.5	U	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	U	0.34
Aroclor 1016	12674-11-2	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.011
Aroclor 1016	12674-11-2	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1016	12674-11-2	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1016	12674-11-2	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	U	0.021
Aroclor 1221	11104-28-2	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.018
Aroclor 1221	11104-28-2	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.021
Aroclor 1221	11104-28-2	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	U	0.021
Aroclor 1221	11104-28-2	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	U	0.033
Aroclor 1232	11141-16-5	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.018
Aroclor 1232	11141-16-5	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.021
Aroclor 1232	11141-16-5	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	U	0.021
Aroclor 1232	11141-16-5	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	U	0.033
Aroclor 1242	53469-21-9	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.011
Aroclor 1242	53469-21-9	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1242	53469-21-9	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1242	53469-21-9	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	U	0.021
Aroclor 1248	12672-29-6	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.011
Aroclor 1248	12672-29-6	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1248	12672-29-6	0.014	mg/kg	0.027	U	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1248	12672-29-6	0.021	mg/kg	0.041	U	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	U	0.021
Aroclor 1254	11097-69-1	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.011
Aroclor 1254	11097-69-1	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1254	11097-69-1	0.025	mg/kg	0.027	J	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	J	0.013
Aroclor 1254	11097-69-1	0.035	mg/kg	0.041	J	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	J	0.021
Aroclor 1260	11096-82-5	0.011	mg/kg	0.022	U	AP1-SD02	AP1008	PEST/PCB	REG	19-May-09	0	0.5	U	0.011
Aroclor 1260	11096-82-5	0.013	mg/kg	0.026	U	AP1-SD03	AP1012	PEST/PCB	REG	19-May-09	0	0.5	U	0.013
Aroclor 1260	11096-82-5	0.021	mg/kg	0.027	J	AP1-SD01	AP1007	PEST/PCB	REG	19-May-09	0	0.5	J	0.013
Aroclor 1260	11096-82-5	0.113	mg/kg	0.041	J	AP1-SD04	AP1013	PEST/PCB	REG	20-May-09	0	0.5	J	0.021
Arsenic	7440-38-2	4	mg/kg	0.6		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.27
Arsenic	7440-38-2	7.6	mg/kg	0.61		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.27
Arsenic	7440-38-2	9.3	mg/kg	0.51		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.23
Arsenic	7440-38-2	15.9	mg/kg	0.97		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.44
Barium	7440-39-3	31.3	mg/kg	15		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.37
Barium	7440-39-3	35.7	mg/kg	13		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.32

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Barium	7440-39-3	57.5	mg/kg	15		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.38
Barium	7440-39-3	110	mg/kg	24		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.61
Benzo(a)anthracene	56-55-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzo(a)anthracene	56-55-3	0.121	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Benzo(a)anthracene	56-55-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzo(a)anthracene	56-55-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Benzo(a)pyrene	50-32-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzo(a)pyrene	50-32-8	0.112	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Benzo(a)pyrene	50-32-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzo(a)pyrene	50-32-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Benzo(b)fluoranthene	205-99-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzo(b)fluoranthene	205-99-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzo(b)fluoranthene	205-99-2	0.175	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Benzo(b)fluoranthene	205-99-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Benzo(ghi)perylene	191-24-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzo(ghi)perylene	191-24-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzo(ghi)perylene	191-24-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Benzo(ghi)perylene	191-24-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Benzo(k)fluoranthene	207-08-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzo(k)fluoranthene	207-08-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzo(k)fluoranthene	207-08-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Benzo(k)fluoranthene	207-08-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Benzoic acid	65-85-0	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Benzoic acid	65-85-0	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.52
Benzoic acid	65-85-0	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.84
Benzoic acid	65-85-0	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	2.2
Benzyl alcohol	100-51-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Benzyl alcohol	100-51-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Benzyl alcohol	100-51-6	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Benzyl alcohol	100-51-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Beryllium	7440-41-7	0.3	mg/kg	0.37	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	0.075
Beryllium	7440-41-7	0.5	mg/kg	0.32		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.064
Beryllium	7440-41-7	0.62	mg/kg	0.38		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.076
Beryllium	7440-41-7	1.6	mg/kg	0.61		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.12
Bis(2-chloroethoxy)methane	111-91-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Bis(2-chloroethoxy)methane	111-91-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Bis(2-chloroethoxy)methane	111-91-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Bis(2-chloroethoxy)methane	111-91-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Bis(2-chloroethyl)ether	111-44-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Bis(2-chloroethyl)ether	111-44-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Bis(2-chloroethyl)ether	111-44-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Bis(2-chloroethyl)ether	111-44-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Bis(2-chloroisopropyl)ether	108-60-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Bis(2-chloroisopropyl)ether	108-60-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Bis(2-chloroisopropyl)ether	108-60-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Bis(2-chloroisopropyl)ether	108-60-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Bis(2-ethylhexyl)phthalate	117-81-7	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.26
Bis(2-ethylhexyl)phthalate	117-81-7	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.42
Bis(2-ethylhexyl)phthalate	117-81-7	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	1.1
Bromophenyl phenyl ether, 4-	101-55-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Bromophenyl phenyl ether, 4-	101-55-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Bromophenyl phenyl ether, 4-	101-55-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Bromophenyl phenyl ether, 4-	101-55-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Butyl benzyl phthalate	85-68-7	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Butyl benzyl phthalate	85-68-7	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Butyl benzyl phthalate	85-68-7	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Cadmium	7440-43-9	0.23	mg/kg	0.3	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	0.075
Cadmium	7440-43-9	0.32	mg/kg	0.25		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.064
Cadmium	7440-43-9	0.55	mg/kg	0.3		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.076
Cadmium	7440-43-9	0.59	mg/kg	0.48		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.12
Calcium	7440-70-2	10400	mg/kg	320		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		6.4
Calcium	7440-70-2	13700	mg/kg	610		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		12
Calcium	7440-70-2	16800	mg/kg	370		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		7.5
Calcium	7440-70-2	29900	mg/kg	380		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		7.6

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Carbazole	86-74-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Carbazole	86-74-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Carbazole	86-74-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Carbazole	86-74-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Chloro-3-methylphenol, 4-	59-50-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Chloro-3-methylphenol, 4-	59-50-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Chloro-3-methylphenol, 4-	59-50-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Chloro-3-methylphenol, 4-	59-50-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Chloroaniline, 4-	106-47-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Chloroaniline, 4-	106-47-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Chloroaniline, 4-	106-47-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Chloroaniline, 4-	106-47-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Chloronaphthalene, 2-	91-58-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Chloronaphthalene, 2-	91-58-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Chloronaphthalene, 2-	91-58-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Chloronaphthalene, 2-	91-58-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Chlorophenol, 2-	95-57-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Chlorophenol, 2-	95-57-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Chlorophenol, 2-	95-57-8	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Chlorophenol, 2-	95-57-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Chlorophenyl phenyl ether, 4-	7005-72-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Chlorophenyl phenyl ether, 4-	7005-72-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Chlorophenyl phenyl ether, 4-	7005-72-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Chlorophenyl phenyl ether, 4-	7005-72-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Chromium	7440-47-3	7.8	mg/kg	0.75		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.12
Chromium	7440-47-3	11.8	mg/kg	0.64		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.1
Chromium	7440-47-3	15.6	mg/kg	1.2		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.19
Chromium	7440-47-3	16.9	mg/kg	0.76		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.12
Chrysene	218-01-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Chrysene	218-01-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Chrysene	218-01-9	0.149	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Chrysene	218-01-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Cobalt	7440-48-4	4.4	mg/kg	3.7		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.062
Cobalt	7440-48-4	8.9	mg/kg	3.2		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.053
Cobalt	7440-48-4	9.1	mg/kg	6.1		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.1
Cobalt	7440-48-4	9.9	mg/kg	3.8		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.063
Copper	7440-50-8	10.5	mg/kg	1.9		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.16
Copper	7440-50-8	17.1	mg/kg	1.6		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.13
Copper	7440-50-8	24.5	mg/kg	3		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.25
Copper	7440-50-8	38.5	mg/kg	1.9		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.16
Dibenz(a,h)anthracene	53-70-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dibenz(a,h)anthracene	53-70-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dibenz(a,h)anthracene	53-70-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Dibenz(a,h)anthracene	53-70-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Dibenzofuran	132-64-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dibenzofuran	132-64-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dibenzofuran	132-64-9	0.15	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Dibenzofuran	132-64-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Dichlorobenzene, 1,2-	95-50-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.056
Dichlorobenzene, 1,2-	95-50-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.068
Dichlorobenzene, 1,2-	95-50-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.11
Dichlorobenzene, 1,2-	95-50-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.28
Dichlorobenzene, 1,3-	541-73-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.056
Dichlorobenzene, 1,3-	541-73-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.068
Dichlorobenzene, 1,3-	541-73-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.11
Dichlorobenzene, 1,3-	541-73-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.28
Dichlorobenzene, 1,4-	106-46-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dichlorobenzene, 1,4-	106-46-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.063
Dichlorobenzene, 1,4-	106-46-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.1
Dichlorobenzene, 1,4-	106-46-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.26
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Dichlorobenzidine, 3,3'-	91-94-1	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Dichlorobenzidine, 3,3'-	91-94-1	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Dichlorobenzidine, 3,3'-	91-94-1	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dichlorophenol, 2,4-	120-83-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Dichlorophenol, 2,4-	120-83-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Dichlorophenol, 2,4-	120-83-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Diethyl phthalate	84-66-2	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Diethyl phthalate	84-66-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.26
Diethyl phthalate	84-66-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.42
Diethyl phthalate	84-66-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	1.1
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Dimethyl phthalate	131-11-3	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Dimethyl phthalate	131-11-3	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Dimethyl phthalate	131-11-3	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dimethylphenol, 2,4-	105-67-9	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dimethylphenol, 2,4-	105-67-9	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Dimethylphenol, 2,4-	105-67-9	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Di-n-butyl phthalate	84-74-2	0.18	mg/kg	0.43	J	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	J	0.087
Di-n-butyl phthalate	84-74-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Di-n-butyl phthalate	84-74-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Di-n-butyl phthalate	84-74-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Dinitro-2-methylphenol, 4,6-	534-52-1	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.14
Dinitro-2-methylphenol, 4,6-	534-52-1	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.17
Dinitro-2-methylphenol, 4,6-	534-52-1	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.27
Dinitro-2-methylphenol, 4,6-	534-52-1	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.69
Dinitrobenzene, 1,3-	99-65-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.046
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.047
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.05
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.051
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.52
Dinitrophenol, 2,4-	51-28-5	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.84
Dinitrophenol, 2,4-	51-28-5	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	2.2
Dinitrotoluene, 2,4-	121-14-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.052
Dinitrotoluene, 2,4-	121-14-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.053
Dinitrotoluene, 2,4-	121-14-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.056
Dinitrotoluene, 2,4-	121-14-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.057
Dinitrotoluene, 2,4-	121-14-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dinitrotoluene, 2,4-	121-14-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dinitrotoluene, 2,4-	121-14-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Dinitrotoluene, 2,4-	121-14-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Dinitrotoluene, 2,6-	606-20-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.046
Dinitrotoluene, 2,6-	606-20-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.047
Dinitrotoluene, 2,6-	606-20-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.05
Dinitrotoluene, 2,6-	606-20-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.051
Dinitrotoluene, 2,6-	606-20-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Dinitrotoluene, 2,6-	606-20-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Dinitrotoluene, 2,6-	606-20-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Dinitrotoluene, 2,6-	606-20-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Di-n-octyl phthalate	117-84-0	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Di-n-octyl phthalate	117-84-0	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Di-n-octyl phthalate	117-84-0	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Fluoranthene	206-44-0	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Fluoranthene	206-44-0	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Fluoranthene	206-44-0	0.191	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Fluoranthene	206-44-0	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Fluorene	86-73-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Fluorene	86-73-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Fluorene	86-73-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Fluorene	86-73-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Hexachlorobenzene	118-74-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Hexachlorobenzene	118-74-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Hexachlorobenzene	118-74-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Hexachlorobenzene	118-74-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Hexachlorobutadiene	87-68-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Hexachlorobutadiene	87-68-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Hexachlorobutadiene	87-68-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Hexachlorobutadiene	87-68-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Hexachlorocyclopentadiene	77-47-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Hexachlorocyclopentadiene	77-47-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Hexachlorocyclopentadiene	77-47-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Hexachlorocyclopentadiene	77-47-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Hexachloroethane	67-72-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Hexachloroethane	67-72-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.063
Hexachloroethane	67-72-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.1
Hexachloroethane	67-72-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.26
HMX	2691-41-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.075
HMX	2691-41-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.076
HMX	2691-41-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.08
HMX	2691-41-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.082
Indeno(1,2,3-cd)pyrene	193-39-5	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Indeno(1,2,3-cd)pyrene	193-39-5	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Indeno(1,2,3-cd)pyrene	193-39-5	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Indeno(1,2,3-cd)pyrene	193-39-5	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Iron	7439-89-6	9270	mg/kg	7.5		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		1.7
Iron	7439-89-6	19300	mg/kg	6.4		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		1.5
Iron	7439-89-6	21400	mg/kg	12		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		2.8
Iron	7439-89-6	21700	mg/kg	7.6		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		1.7
Isophorone	78-59-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Isophorone	78-59-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Isophorone	78-59-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Isophorone	78-59-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Lead	7439-92-1	7	mg/kg	7.5	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	0.15
Lead	7439-92-1	13	mg/kg	6.4		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.13
Lead	7439-92-1	22.9	mg/kg	12		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.24
Lead	7439-92-1	23.7	mg/kg	7.6		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.15
Magnesium	7439-95-4	1810	mg/kg	610		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		12
Magnesium	7439-95-4	4360	mg/kg	320		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		6.4
Magnesium	7439-95-4	4970	mg/kg	370		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		7.5
Magnesium	7439-95-4	9370	mg/kg	380		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		7.6
Manganese	7439-96-5	165	mg/kg	1.1		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.037
Manganese	7439-96-5	337	mg/kg	1.9		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.064
Manganese	7439-96-5	446	mg/kg	2.3		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.076
Manganese	7439-96-5	1670	mg/kg	9.1		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.3
Mercury	7439-97-6	0.021	mg/kg	0.12	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	0.018
Mercury	7439-97-6	0.024	mg/kg	0.1	J	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	B	0.015
Mercury	7439-97-6	0.11	mg/kg	0.2	J	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	B	0.029
Mercury	7439-97-6	0.14	mg/kg	0.13		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.019
Methylnaphthalene, 2-	91-57-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Methylnaphthalene, 2-	91-57-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Methylnaphthalene, 2-	91-57-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Methylnaphthalene, 2-	91-57-6	0.616	mg/kg	0.42		AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5		0.084
Methylphenol, 2-	95-48-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Methylphenol, 2-	95-48-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Methylphenol, 2-	95-48-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Methylphenol, 2-	95-48-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Naphthalene	91-20-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Naphthalene	91-20-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Naphthalene	91-20-3	0.337	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Naphthalene	91-20-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Nickel	7440-02-0	12	mg/kg	3		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.17
Nickel	7440-02-0	21.3	mg/kg	2.5		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.15
Nickel	7440-02-0	25.7	mg/kg	4.8		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.28
Nickel	7440-02-0	26.7	mg/kg	3		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.17
Nitroaniline, 2-	88-74-4	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Nitroaniline, 2-	88-74-4	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Nitroaniline, 2-	88-74-4	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Nitroaniline, 2-	88-74-4	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Nitroaniline, 3-	99-09-2	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Nitroaniline, 3-	99-09-2	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
Nitroaniline, 3-	99-09-2	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Nitroaniline, 3-	99-09-2	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Nitroaniline, 4-	100-01-6	0.215	mg/kg	0.43	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
Nitroaniline, 4-	100-01-6	0.26	mg/kg	0.52	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Nitroaniline, 4-	100-01-6	0.42	mg/kg	0.84	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
Nitroaniline, 4-	100-01-6	1.1	mg/kg	2.2	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Nitrobenzene	98-95-3	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.058
Nitrobenzene	98-95-3	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.058
Nitrobenzene	98-95-3	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.062
Nitrobenzene	98-95-3	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.063
Nitrobenzene	98-95-3	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Nitrobenzene	98-95-3	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Nitrobenzene	98-95-3	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Nitrobenzene	98-95-3	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Nitrophenol, 2-	88-75-5	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Nitrophenol, 2-	88-75-5	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Nitrophenol, 2-	88-75-5	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Nitrophenol, 2-	88-75-5	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Nitrophenol, 4-	100-02-7	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.52
Nitrophenol, 4-	100-02-7	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.84
Nitrophenol, 4-	100-02-7	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	2.2
Nitrotoluene, 2-	88-72-2	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.044
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.044
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.047
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.048
Nitrotoluene, 3-	99-08-1	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.073
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.074
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.079
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.08
Nitrotoluene, 4-	99-99-0	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.054
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.055
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.058
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.059
n-Nitroso-di-n-propylamine	621-64-7	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
n-Nitroso-di-n-propylamine	621-64-7	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
n-Nitroso-di-n-propylamine	621-64-7	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
n-Nitroso-di-n-propylamine	621-64-7	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
n-Nitrosodiphenylamine	86-30-6	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.087
n-Nitrosodiphenylamine	86-30-6	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.1
n-Nitrosodiphenylamine	86-30-6	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.17
n-Nitrosodiphenylamine	86-30-6	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Pentachlorophenol	87-86-5	0.55	mg/kg	1.1	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.43
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.52
Pentachlorophenol	87-86-5	1.05	mg/kg	2.1	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.84
Pentachlorophenol	87-86-5	2.7	mg/kg	5.4	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	2.2
Phenanthrene	85-01-8	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Phenanthrene	85-01-8	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Phenanthrene	85-01-8	0.306	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Phenanthrene	85-01-8	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Phenol	108-95-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Phenol	108-95-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Phenol	108-95-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Phenol	108-95-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Potassium	7440-09-7	725	mg/kg	750	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	7.5
Potassium	7440-09-7	1170	mg/kg	640		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		6.4
Potassium	7440-09-7	1340	mg/kg	1200		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		12
Potassium	7440-09-7	1740	mg/kg	760		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		7.6
Pyrene	129-00-0	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Pyrene	129-00-0	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Pyrene	129-00-0	0.195	mg/kg	0.42	J	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	J	0.084
Pyrene	129-00-0	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
RDX	121-82-4	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.074
RDX	121-82-4	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.075
RDX	121-82-4	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.079
RDX	121-82-4	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.081
Selenium	7782-49-2	0.32	mg/kg	7.6	J	AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5	B	0.24
Selenium	7782-49-2	0.38	mg/kg	6.4	J	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	B	0.2
Selenium	7782-49-2	1.3	mg/kg	12	J	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	B	0.38
Selenium	7782-49-2	3.75	mg/kg	7.5	U	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	U	0.23

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 1
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	REP_LIMIT	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	METH_DET_LIM
Silver	7440-22-4	0.099	mg/kg	0.76	J	AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5	B	0.091
Silver	7440-22-4	0.32	mg/kg	0.64	U	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	U	0.076
Silver	7440-22-4	0.375	mg/kg	0.75	U	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	U	0.09
Silver	7440-22-4	0.6	mg/kg	1.2	U	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	U	0.15
Sodium	7440-23-5	83.1	mg/kg	750	J	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	B	37
Sodium	7440-23-5	112	mg/kg	760	J	AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5	B	38
Sodium	7440-23-5	320	mg/kg	640	U	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	U	32
Sodium	7440-23-5	600	mg/kg	1200	U	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	U	61
Tetryl	479-45-8	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.045
Tetryl	479-45-8	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.045
Tetryl	479-45-8	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.048
Tetryl	479-45-8	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.049
Thallium	7440-28-0	1.9	mg/kg	3.8	U	AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5	U	2.6
Thallium	7440-28-0	3.2	mg/kg	6.4	U	AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5	U	2.2
Thallium	7440-28-0	3.75	mg/kg	7.5	U	AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5	U	2.5
Thallium	7440-28-0	6	mg/kg	12	U	AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5	U	8.2
Total organic carbon	10-35-5	21000	mg/kg	0.22		AP1-SD01	AP1007	GEN CHEMISTRY	REG	19-May-09	0	0.5		0.22
Total organic carbon	10-35-5	43000	mg/kg	0.8		AP1-SD04	AP1013	GEN CHEMISTRY	REG	20-May-09	0	0.5		0.8
Trichlorobenzene, 1,2,4-	120-82-1	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Trichlorobenzene, 1,2,4-	120-82-1	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Trichlorobenzene, 1,2,4-	120-82-1	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Trichlorobenzene, 1,2,4-	120-82-1	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Trichlorophenol, 2,4,5-	95-95-4	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Trichlorophenol, 2,4,5-	95-95-4	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Trichlorophenol, 2,4,5-	95-95-4	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Trichlorophenol, 2,4,5-	95-95-4	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Trichlorophenol, 2,4,6-	88-06-2	0.11	mg/kg	0.22	U	AP1-SD02	AP1008	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.043
Trichlorophenol, 2,4,6-	88-06-2	0.13	mg/kg	0.26	U	AP1-SD03	AP1012	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.052
Trichlorophenol, 2,4,6-	88-06-2	0.21	mg/kg	0.42	U	AP1-SD04	AP1013	SEMIVOLATILES	REG	20-May-09	0	0.5	U	0.084
Trichlorophenol, 2,4,6-	88-06-2	0.55	mg/kg	1.1	U	AP1-SD01	AP1007	SEMIVOLATILES	REG	19-May-09	0	0.5	U	0.22
Trinitrobenzene, 1,3,5-	99-35-4	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.044
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.044
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.047
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.048
Trinitrotoluene, 2,4,6-	118-96-7	0.085	mg/kg	0.17	U	AP1-SD01	AP1007	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.044
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.18	U	AP1-SD04	AP1013	EXPLOSIVES	REG	20-May-09	0	0.5	U	0.044
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.19	U	AP1-SD02	AP1008	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.047
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.19	U	AP1-SD03	AP1012	EXPLOSIVES	REG	19-May-09	0	0.5	U	0.048
Vanadium	7440-62-2	12.4	mg/kg	3.7		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.049
Vanadium	7440-62-2	19.2	mg/kg	3.2		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.042
Vanadium	7440-62-2	21.9	mg/kg	3.8		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.05
Vanadium	7440-62-2	25.5	mg/kg	6.1		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.08
Zinc	7440-66-6	33.3	mg/kg	1.5		AP1-SD03	AP1012	METALS	REG	19-May-09	0	0.5		0.28
Zinc	7440-66-6	45.3	mg/kg	1.3		AP1-SD02	AP1008	METALS	REG	19-May-09	0	0.5		0.24
Zinc	7440-66-6	98.9	mg/kg	1.5		AP1-SD01	AP1007	METALS	REG	19-May-09	0	0.5		0.29
Zinc	7440-66-6	137	mg/kg	2.4		AP1-SD04	AP1013	METALS	REG	20-May-09	0	0.5		0.46

RESPONSE TO COMMENTS

Response to External Comments
Draft Baseline Human Health Risk Assessment and
Screening-Level Ecological Risk Assessment,
Ash Pit 1 and Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio,
Dated December 20, 2010
FUDS Project No. G05OH001821

Note that the following comments reference the Baseline Human Health Risk Assessment (BHHRA) for Ash Pit 1 (AP1) and Ash Pit 3 (AP3) and the Screening-Level Ecological Risk Assessment (SLERA) for AP1 and Ash Pit 3 AP3, each of which was issued as a combined AP1/AP3 report. Please note that the U.S. Army Corps of Engineers has decided to issue two separate BHHRA reports, one for AP1 and one for AP3, rather than the combined report issued previously. The AP1 and AP3 SLERAs are likewise being issued as two separate reports.

Comments by Janusz Byczkowski, Ph.D., Ohio Environmental Protection Agency (OEPA) Toxicologist, received February 17, 2011.

Comment 1: **BHHRA Executive Summary AP3 P. ES-5 L# 1 – 7 S. 7.3 P. 7-4 L# 24 and P. 7-5 L# 4. <u>This document states:</u> "… *ILCR = 1E-6 (excluding background-related arsenic)* […] *ILCR = 3E-6 (excluding background-related arsenic)*…"and then "…*apparent background-related* manganese […] *appropriately excluded* […] *background-related contribution of arsenic* […] *appropriately excluded*…" While in the Section 2.4.3.1 (P. 2-8) at least there is a sentence, that background "…*method* […] *differs from that shown in current OEPA (2004a) guidance*…" there is no such an explanation provided either in *Executive Summary,* in *Introduction*, or in *Recommendations*. To the contrary, in the *Introduction* (Sect. 1.5, P. 1-5; L# 17) this document states that "…*The BHHRA was performed consistent with* […] *Ohio Environmental Protection Agency (OEPA) guidance*…" and then (P. ES-6, L# 24) "…*background-related contributions of arsenic in AP3 soil are appropriately excluded*…" Since the *Executive Summary, Introduction* and *Recommendations,* are the parts of the document which probably will be the most read by the public, a detailed rationale for deviation from the current OEPA-DERR standard risk assessment guidance should be included as a part of the introduction of the BHHRA document. I suggest a revision of these Documents, which should follow the suggestions listed below:**

a. On *Distribution Lists* (BHHRA, SLERA) please correct the address of Janusz Z. Byczkowski.

b. Please emphasize in *Executive Summary* that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification in the *Introduction*.

Response 1: a. The corrected address shall be used for future deliverables:

Janusz Z. Byczkowski, Ph.D., D.Sc., DABT.
Div. Emergency and Remedial Response
Lazarus Government Ctr.
P.O. Box 1049
50 W. Town Str., Suite 700
Columbus, OH 43216-1049

b. It is agreed that it is possible that certain stakeholders may only read the executive summary of this document. In the executive summary on page ES-3, 1st full paragraph, we will add text stating that the standard steps of risk assessment, data analysis, exposure assessment, toxicity assessment, risk characterization, uncertainty analysis were executed in the risk assessment. Data analysis for inorganic constituents differs from OEPA-DERR 2004, and is further described in Section 2.4.3.1 Background Screening of Inorganics.

Comment 2: **BHHRA S. 3.2.1 P. 3-19 L# 17 and P. 3-20 L# 3 Also, Tables 2-6 to 2-9; 2-11; 2-13; 2-14; and Appendix B. This document states: "…*One-half the reporting limit is used as the ProUCL input concentration for nondetects*…" The ProUCL ver 4.0.(05) should be used for modeling/calculating reasonable maximum exposure (RMEs) with 100% reporting limit (RL) as input concentration for nondetects (but not for screening, or calculations of background concentration). For screening- selecting COPCs, on the other hand, it is appropriate to use the MAXIMUM concentration in each medium or 1/2 of the Reporting Limit (RL) if the nondetect RL exceeds the toxicity-based screening concentration (=0.1 x RSL for non-carcinogenic or 1.0 x RSL for carcinogenic chemicals). Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: Maximum detected concentrations (MDC) were used in the data analysis screening portion of the risk assessment. The exposure point concentration (EPC) protocol used in the BHHRA is consistent with that which has been performed for PBOW human health and ecological risk assessments for the past decade, consistent with other FUDS assessments across the country and consistent with RAGS Part A (EPA 1989). PBOW EPC protocol was based on RAGS Part A Chapter 5 Data Evaluation Section which say to use ½ the quantitation limit for non-detect results if there is reason to believe that the chemical present in a sample. Quantitation limit is further defined as the lowest level at which a chemical can be accurately reproducibly quantified. This guidance even recommends that individual samples with elevated RLs be excluded from the quantitative risk assessment.

The ProUCL Version 4.00.05 05 User's Guide (EPA, 2010a) states that the full detection limit should be used rather than ½ the detection limit. Section

1.12 of the ProUCL User's Guide cautions that ProUCL does not make distinctions between MDLs, adjusted MDLs, sample quantitation limits, or instrument detection limits, and that, "It is the user's responsibility to supply correct numerical values (should be entered as reported detection limit value) for ND observations in the data set…" With this responsibility in mind, it must be recognized that the RL is not a detection limit, but is a limit of quantitation, which is defined as the concentration at which an analyte can be reported with a specified degree of accuracy (generally 20 percent, depending on the method). The method detection limit (MDL), however, is a true sample-specific detection limit reported for each sample and analyte. It is defined as the lowest concentration of an analyte that can be distinguished from a blank with 99% certainty. Note that the RL is the MDL multiplied by a factor of 3 to 5; that is, the RL (a limit of quantitation) is 3 to 5 times higher than the MDL (detection limit). The detection limits (i.e., MDLs) are not available for some of the historical data collected prior to 2008, but the RLs are available. Use of ½ the RL is a conservative (i.e., high) estimate of the full detection limit, as ½ the RL is 1.5 to 2.5 times higher than the detection limit.

Further, the use of full RLs as "detection limits" in ProUCL is not desirable because goodness-of-fit tests used in the ProUCL upper confidence limit module are based on all values greater than the highest value identified by the ProUCL user as a "detection limit," as described in Section 4.1 of the ProUCL Version 4.00.05 Technical Guide (EPA, 2010b). For example, a hypothetical data set of n=30 may have 29 detections and a single nondetect characterized by an elevated RL value that is greater than all detected values except for 5 samples. In this case, ProUCL bases the distribution only on the 5 samples that are higher than the elevated RL. This may either limit the selection of UCL methods or may result in the selection of a distribution type that fits the 5 highest detections but is inappropriate for the rest of the sample set (i.e., the other 24 detections). As a result, a UCL value that is nonconservative may be selected because the wrong distribution type was selected by ProUCL based only on the five highest detections. Also, EPA (1989) risk assessment guidance directs that "J-" qualified data should be used to calculate the exposure point concentration based on the reported levels. Because many "J" qualified data are less than the RL (but greater than the MDL), the use of even a single RL for a nondetect result will likely eliminate the inclusion of these "J" values in the distribution fitting. Therefore, use of the RL as the "detection limit" value in ProUCL may lead to distribution testing input that eliminates the consideration of J- qualified data, which is inconsistent with the current EPA (1989) risk assessment guidance practice of assuming that J-qualified data are valid detected values.

References cited in this response:

U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.00.04 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April, EPA/600/R-07/038, April.

U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.00.04 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund***, ***Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002, May.

Comment 1: **SLERA ES. P. 1 L# 31. This document states: "*…additional screening criteria (e.g., comparison with background data…*" For comments, see above: BHHRA comment # 1. Please emphasize that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification.**

Response 1: See response to HHRA comment 1.b. Text will be added to ES-1 3rd full paragraph stating that background screening for inorganics differs from OEPA-DERR 2004. In section 2.2.3.3 Background Evaluation 2nd full paragraph, will be expanded with rationale for background inorganic screening, and that the background screening differs from OEPA-DERR 2004. In Section 2.2.3.3 a more detailed description of inorganic background screening will be included. The PBOW Project Delivery Team, including members from the U.S. Army Corps of Engineers (USACE), Nashville and Huntington Districts and their contractors, the National Aeronautics and Space Administration (NASA), and the OEPA have strived to cooperate together for more than a decade. Site-specific team agreements have been made over the years, including how background screening for inorganics. The methodology used for background screening and evaluation in the risk assessment for inorganics was previously requested by OEPA risk assessors for soil in 1999 and was again agreed to by the Project Delivery Team in 2002 for groundwater (Shaw, 2005). It has been used for all PBOW risk assessments conducted since 1999 for consistency from AOC to AOC.

Comment 2: **SLERA S. 2.2.2 P. 2-10 L#14 Also, Tables 2-9 to 2-14. This document states: "*…One-half the reporting limit is used as the ProUCL input concentration for nondetects…*" For comments, see above: BHHRA comment # 2. Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: See HHRA response #2.

Comment 3: **SLERA S.5.1 P. 5-2 L# 3 and S. 6.0 P. 6-1 L.# 11. This document states:**

"*…Thallium was a COPEC in soil at AP 3 and was only detected in 3 out of 16 soil samples (Table 2-12)…*" and then: "*…Thallium was only detected in*

***2 out of 16 samples at concentrations exceeding toxicological and background concentrations…*"**

These two statements may appear contradictory, especially that the Table 2-12 is not detailed enough to relate individual detected concentrations to toxicity values or background levels.
Please harmonize the two statements with Table 2-12.

Response 3: The statements are correct as written, as one refers to the overall detection frequency, and the other refers to the number of detections that exceed screening criteria (in looking at Table 2-12, one can see that the minimum detected thallium concentration of 0.5 mg/kg is below both the BSC and ESV). To clear up any confusion, the statement in section 5.1 will be revised consistent with the following, "Thallium was a COPEC in soil at AP3 and was only detected in 3 out of 16 soil samples, *2 of which exceeded the BSC and ESV* (Table 2-12)."

APPENDIX D

ASH PIT NO. 1 AND ASH PIT NO. 3
SCR ADDENDUM FOR COAL YARD NO. 1

Shaw® a world of Solutions™

Final
October 2012

Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps of Engineers
Nashville District

FUDS Project No. G05OH001821

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Final
October 2012

Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

FUDS Project No.
G05OH001821

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October 18, 2012

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Kathy McClanahan)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Submittal of the Final Ash Pit No. 1 and Ash Pit No. 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013, Shaw is pleased to submit this Final Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio.

Enclosed are four copies of this final report. Copies have also been sent to those on the distribution list, as indicated. As requested, the document was sent to the Center of Expertise and RAB in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven T. Downey, PE, PMP
Project Manager

Enclosures

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DISCIPLINE SIGN-OFF REVIEW

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013 Delivery Order No. DX02

Project No. 132457 Task/Phase Number: 41000000

Document Type	Identify specific section or segment covered by this checkprint	Document Origin
☐ Technical / Cost Proposal		X Originator Developed
☐ RFP		☐ Edited Standard
☐ Contract / Subcontract		☐ Client Furnished
☐ Work Plans		
X Report	Site Characterization Report Addendum	**Document Status**
☐ Risk Assessment / Evaluation		☐ Preliminary
☐ Specifications & Plans		☐ Internal Draft
☐ Design Calculations		☐ Draft
☐ Tables		☐ Draft Final
☐ Drawings / Figures		X Final
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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 1 and Ash Pit No. 3
Site Characterization Report Addendum for
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Prepared for:

Commander
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Shaw Project Number 132457

October 2012

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List of Acronyms

bgs	below ground surface
BHRRA	baseline human health risk assessment
BSC	background screening concentration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DNT	dinitrotoluene
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
IDW	investigation-derived waste
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NASA	National Aeronautics and Space Administration
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PCB	polychlorinated biphenyl
PETN	pentolite
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RBSC	risk-based screening concentration
SCR	site characterization report
Shaw	Shaw Environmental and Infrastructure, Inc.
SLERA	screening level ecological risk assessment
SWSAP	site-wide sampling and analysis plan
SWSHP	site-wide safety and health plan
SVOC	semivolatile organic compound
TAL	target analyte list
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
USACE	U.S. Army Corps of Engineers

Executive Summary

The U.S. Army Corps of Engineers is investigating the former Plum Brook Ordnance Works (PBOW) in Sandusky, Erie County, Ohio, under the Defense Environmental Restoration Program's Formerly Used Defense Sites authorization and funding. The PBOW site was used for the manufacture of explosives during World War II. The former PBOW site is currently operated and maintained by the National Aeronautics and Space Administration as Plum Brook Station, an active testing and research installation associated with the John H. Glenn Research Center of Cleveland, Ohio. The U.S. Army Corps of Engineers contracted Shaw Environmental and Infrastructure, Inc. (Shaw) to conduct an addendum to the existing Ash Pit No. 1 and Ash Pit No. 3 site characterization report (SCR) documenting soil conditions of the Ash Pit No. 1 associated coal yard (Coal Yard No. 1). The specific investigation site is located immediately adjacent to (west) of Powerhouse No. 1, which is located in the central portion of PBOW.

During PBOW explosives manufacturing operations from 1941 to 1945, three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were present to support the nitroaromatic manufacturing process. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas to provide coal for use in the powerhouse boilers. The coal was brought into the yards via train. All stockpiled coal has been removed, but the removal date is not known. Chemical contamination (increase of inorganic compounds) of the soil resulting from the leaching of precipitation through the coal stored in Coal Yard No. 1 is expected to consist primarily of semivolatile organic compounds (SVOC) and target analyte list (TAL) metals or inorganic compounds, although nitroaromatics and volatile organic compounds could be possible.

The SCR for Ash Pit No. 1 and Ash Pit No. 3 was submitted as a final report in November 2010. This addendum details remedial investigation activities for Coal Yard No. 1 and includes soil sample collection, analytical results, and recommendations. This document is one of two planned reports. The remaining report will consist of a remedial investigation summary report and will be submitted under separate cover. The remedial investigation summary report will include information from the

Ash Pit No. 1 and Ash Pit No. 3 site characterization reports including this addendum as well as the baseline human health risk assessments and the screening-level ecological risk assessments that have been prepared for each site.

Activities for investigation of the Coal Yard No. 1 were initiated based upon review of 2009 groundwater analytical data from overburden/shale monitoring well AP1-MW01, located downgradient of Coal Yard No. 1. Manganese and iron concentrations exceeded both risk-based screening levels (RBSC) and background screening levels (BSC) in this monitoring well. Reasons for exceedance of manganese and iron were unclear, although based upon the location of the piezometer and monitoring well and groundwater flow direction, a potential upgradient source (Coal Yard No. 1) appeared likely.

No previous investigations at Coal Yard No. 1 have been conducted.

Remedial investigation activities were conducted by Shaw for Coal Yard No. 1 in December 2011. Field activities included hand auger operation with soil sampling, soil borehole lithologic logging, paperwork completion, surveying, and disposal of investigation-derived waste.

Four soil boring locations were chosen to provide adequate coverage of the coal yards based upon field observations of surface and subsurface coal in the former coal yard area. During field reconnaissance, a pickax was used to dig shallow excavations to determine the presence of coal and the coal thickness. From each boring location, soil samples were collected from three distinct intervals to provide evidence of possible soil contamination. Surface soil samples were collected from soil immediately below the coal material. Subsurface soil samples were collected from 3 to 5 feet and 8 to 10 feet below the existing ground surface. Each soil sample from the selected interval was transferred to a new resealable plastic bag and homogenized. Soil was analyzed for nitroaromatics, SVOCs, and TAL metals. Soil from the 0 to 1 and 3 to 5-feet intervals were also analyzed for polychlorinated biphenyls. Soil sampling was completed on December 20, 2011.

Analytical results from the various media collected were compared to RBSCs derived from November 2011 U.S. Environmental Protection Agency regional screening levels for a residential land-use scenario. These screening levels were used as points of comparison in this SCR addendum. Site contaminants will be further evaluated in risk assessments. In addition, the analytical results for the metals in the 2011 soil samples were compared to soil BSCs.

Significant conclusions from the surface and subsurface soil analytical results are as follows:

- No nitroaromatics or polychlorinated biphenyls were detected in surface or subsurface soil samples.
- No SVOC analytes were detected above the RBSCs in any surface or subsurface soil sample.
- No TAL metals were detected above both the RBSC and BSC values in surface soil samples.
- Only one TAL metal (thallium) was detected at a concentration above both the RBSC and BSC value in subsurface soil samples. However, this result, detected at the 3- to 5-foot interval of a quality assurance sample (i.e., the field split analyzed by an independent lab) at a concentration (1.5 milligrams per kilogram [mg/kg]) slightly above the BSC (1.3 mg/kg), is questionable because thallium was not detected in the associated quality control sample and thallium was detected at a concentration (0.41 mg/kg) that was less than one-third the BSC in the regular sample. Note that the quality control sample is a field duplicate sample analyzed by the same lab as the regular field sample.
- Total organic carbon was measured in the surface soil at a concentration of 0.27 mg/kg.

Conclusion. The surface and subsurface soil of Coal Yard No. 1 appears to be adequately characterized. A baseline human health risk assessment is not needed because all analytes would be screened out, leaving no chemicals of potential concern for evaluation. Ecological risks will be discussed in the remedial investigation report, which will describe that based on low concentrations of analytes in Coal Yard No. 2, no screening-level ecological risk assessment is required. Recommendations of the SCR will be included in a remedial investigation report, submitted under separate cover.

1.0 Introduction

The U.S. Army is conducting studies of the environmental impact of suspected waste sites at previously owned U.S. Department of Defense properties. The former Plum Brook Ordnance Works (PBOW) is located in Sandusky, Erie County, Ohio (Figure 1-1). PBOW is being investigated under the Defense Environmental Restoration Program for Formerly Used Defense Sites. The investigation is being managed and technically overseen by the Nashville, Tennessee, and Huntington, West Virginia, District Offices of the U.S. Army Corps of Engineers (USACE). This 9,000-acre facility was used for the manufacture of explosives during World War II. The site is currently controlled and maintained by the National Aeronautics and Space Administration (NASA) and is operated as the Plum Brook Station (PBS) of the John H. Glenn Research Center at Lewis Field.

Fieldwork and reporting for Ash Pit No. 1 Coal Yard (Coal Yard No. 1) was performed under Delivery Order DX02 for the USACE Louisville Architecture/Engineering Environmental Services Indefinite Delivery/Indefinite Quantity, Contract Number W912DR-08-D-0013. The site characterization report (SCR) for Ash Pit No. 1 and Ash Pit No. 3 was submitted as a final report in November 2010. This addendum details remedial investigation activities for Coal Yard No. 1 and includes soil sample collection, analytical results, and recommendations.

During a previous investigation, an overburden/shale groundwater monitoring well (AP1-MW01) was installed upgradient of Ash Pit No. 1. Groundwater samples from that well indicated elevated manganese and iron in the groundwater. Manganese was present in both the filtered (32,100 micrograms per liter [µg/L]) and unfiltered (32,300 µg/L) groundwater samples, exceeding the risk-based screening concentration (RBSC) limit of 88 µg/L and the background screening concentration (BSC) limit of 636 µg/L. Review of groundwater quality measurements determined the high concentrations were not a result of elevated turbidity. In addition, the concentration of iron (4,990 µg/L) was above the RBSC limit of 2,600 µg/L and the BSC of 1,550 µg/L. Associated piezometer AP1-PZ05 also exhibited manganese concentrations above RBSC and BSC levels in both the filtered sample (3,540 µg/L) and the unfiltered sample (3,370 µg/L). Based on interpreted groundwater flow for Ash Pit No.1, a former powerhouse coal yard (Coal Yard No. 1) was located immediately upgradient of this well. Evaluation of site information suggested that leaching of the coal in the former coal yard may have impacted the groundwater. Therefore, additional soil sampling was recommended to evaluate the former PBOW coal yard as a potential source of contamination.

The field activities completed by Shaw Environmental and Infrastructure. Inc. (Shaw) for investigation of Coal Yard No. 1 were conducted pursuant to the following documents:

- Site-wide accident prevention plan/site-wide health and safety plan (SWSHP) (Shaw, 2008a)
- Site-wide sampling and analysis plan (SWSAP) (Shaw, 2008b)
- Site-wide quality assurance project plan (QAPP) (Shaw, 2008c).
- Site-specific sampling and analysis plan (Shaw, 2011a).

1.1 Scope of Work and Project Objectives

The scope of this SCR addendum (USACE, 2011) includes updating the existing quality control plan, adding site-specific addenda to the SWSHP and SWSAP, soil sampling, installation and sampling of monitoring wells, surveying, laboratory analysis, and investigation-derived waste (IDW) management and disposal. Figure 1-2 identifies the location of Coal Yard No. 1 in relation to other areas of concern and site features.

The objectives of this investigation to address data gaps in soil samples include the following:

- Conduct soil sampling and lithologic logging
- Conduct laboratory analysis of soil
- Management and disposal of IDW
- Submit an SCR addendum
- Update the baseline human health risk assessment (BHHRA) and screening-level ecological risk assessments (SLERA)
- Prepare and submit a geographic information system deliverable.

This document is one of two planned reports. The remaining report will be the remedial investigation report and will summarize the findings of the following documents:

- Ash Pit No. 1
  - Coal Yard No. 1 SCR Addendum
  - Ash Pit No. 1 SCR

- Ash Pit No. 1 BHHRA
- Ash Pit No. 1 SLERA

- Ash Pit No. 3
  - Coal Yard No. 3 SCR Addendum
  - Ash Pit No. 3 SCR
  - Ash Pit No. 3 BHHRA
  - Ash Pit No. 3 SLERA.

The remedial investigation report is planned to be issued in 2013.

1.2 Report Organization

Chapter 2.0 of this report describes PBOW and the Coal Yard No. 1 site, its physical setting, geology, and hydrogeology features. Sampling strategy and field procedures are described in Chapter 3.0. The analytical program and background comparison data are presented in Chapter 4.0. Chapter 5.0 describes specific-site information and historical and current analytical data. Chapter 6.0 presents media conclusions. Recommendations are provided in Chapter 7.0. References that were used in preparing the report are listed in Chapter 8.0.

Sample collection logs, soil boring logs, and land survey data are provided in Appendices A, B, and C, respectively. An IDW manifest is included in Appendix D. Appendices E through H contain analytical data pertinent to the soil sampling event. Appendix I contains the chains of custody for laboratory analysis.

1.3 Facility Location and Description

The former PBOW site is currently utilized and maintained by NASA and is operated as the PBS, a satellite office of the NASA John H. Glenn Research Center, located at Lewis Field in Cleveland, Ohio. Most of the aerospace testing facilities built at the site in the 1960s are on standby or inactive status. The site is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. Although primarily in Perkins and Oxford Townships, the eastern edge of the site extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The PBOW facility is currently surrounded by a chain-link fence, and the perimeter is patrolled regularly. Access by authorized personnel is limited to established checkpoints. Public access is restricted except during the annual controlled deer hunting season.

1.4 PBOW Site History

The PBOW site was built in early 1941 and manufactured 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite (PETN). Production of explosives began in December 1941 and continued until 1945. During operation, three areas (TNT Area A [TNTA], TNT Area B [TNTB], and TNT Area C [TNTC]) manufactured TNT and DNT and one area manufactured PETN. TNTA consisted of manufacturing lines 1 through 4, TNTB consisted of lines 5 through 7, and TNTC consisted of lines 8 through 12. TNTA is located on the northeast side of PBOW, TNTB is located at the south-central part, and TNTC is located at the southwestern side of PBOW. The PETN manufacturing area is located in the north-central portion of PBOW and lies within the boundaries of Ransom Road on the west, Pentolite Road on the south, and Patrol Road on the north and east. The central portion of the former PETN manufacturing area was occupied by NASA's nuclear reactor, which was decommissioned in 2012 with all aboveground structures demolished and removed from the site.

It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. After the plant was shut down, decontamination of TNT, acid, PETN, and DNT processing lines began. Decontamination was considered complete during the last quarter of 1945. The property was initially transferred to the Ordnance Department after it was certified by the Army to be decontaminated in 1946. This transfer did not include the 2,800 acres comprising the Plum Brook area. The War Assets Administration accepted custody of the remaining acreage (approximately 3,230 acres) in 1946. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts during the 1950s through 1963.

Two property use agreements were entered into by the National Advisory Committee of Aeronautics, the predecessor of NASA, and the Army in 1956 and 1958. On March 15, 1963, accountability for and custody of the entire PBOW property (6,030 acres) was transferred to NASA by the Department of the Army. NASA performed further decontamination during 1964. The NASA decontamination process was accomplished in five steps (Dames and Moore, Inc., 1997a):

1. Inspecting and removing contaminated surface soil above the drain tiles, flumes, etc.

2. Spot checking of subsurface soil in the vicinity of drain tiles, flumes, etc., to determine where the contaminated tiles and flumes were located. Where contamination was found, the flumes, tiles, etc., were removed in sections.

3. Removal of some items previously decontaminated to Level 3X (XXX-military decontamination level established primarily for worker safety that indicates potentially contaminated material or previously contaminated material that has been decontaminated to a zero residual contamination level) condition to a storage facility and additional decontamination of the remainder of the items to a 5X (XXXXX – level that indicates a decontaminated material with no detectable residual contamination) condition in order to be sold ("X" indicates the Army's specific decontamination level).

4. Destruction of all buildings by fire followed by removal of all debris and concrete foundations. All the materials, including the earth, in those areas was flashed and the area was then rough graded.

5. Decontamination of all sump basins and removal of the concrete.

The decontamination process also included burning of nitroaromatic-filled flumes that were excavated. As shown in the records review (Dames & Moore, Inc., 1997b) this was performed on July 10, 1963, near the intersection of Fox Road and Snake Road and is suspected to have also occurred at the Additional Burning Ground area.

On April 18, 1978, NASA declared approximately 2,152 acres of land as excess. This excess acreage included former buffer areas that were not formerly used by the Army and were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess for use as a bus transportation center. The General Services Administration retains the remaining acreage and currently has a use agreement with the Ohio National Guard for 604 acres of the land. NASA presently controls about 6,400 acres and is using the site to conduct space research as a satellite operation of the John H. Glenn Research Center based in Cleveland, Ohio. The details of these land transactions are listed in the site management plan (International Consultants Incorporated, 1995) and can be found at NASA PBS.

1.5 Coal Yard No. 1 Site History

As noted in Section 1.4, PBOW was built in early 1941 and manufactured acid, 2,4,6-TNT, DNT, and pentolite until 1945. Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several

steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas providing coal to be used in the powerhouse's boilers. The coal was brought into the yards via train. Figure 1-2 shows the location of Coal Yard No. 1 on PBOW property.

Former Coal Yard No. 1 is located immediately to the west of Powerhouse No. 1. The historical former coal yard is estimated to have been approximately 350 feet wide by 210 feet in length (approximately 1.7 acres). Half of the Powerhouse No. 1 building was demolished and the other half was remodeled and is currently being used as a storage/shop building and power supply hub station by NASA. The former coal yard is currently covered with grass and brush vegetation. A thin layer of coal was observed on the ground surface in isolated areas and along the northern perimeter during previous site walks. Figure 1-3 shows a historical photograph of the coal yard along with the associated powerhouse and two aboveground fuel oil storage tanks.

No previous environmental investigation has been conducted at Coal Yard No. 1.

2.0 Physical Setting

Figure 2-1 shows the specific site location and general Coal Yard No. 1 features with ground surface topography. Descriptions and information regarding the local geography, topography, surface drainage, regional and local geology and hydrogeology characteristics, and precipitation influence effects on local water levels have been prepared and are included in the final Ash Pit No. 1 and Ash Pit No. 3 SCR (Shaw, 2010).

During the field investigation, the majority of the former Coal Yard No. 1 area was observed to be overgrown with sparsely spaced brush, with the southern perimeter covered with young trees and brush. The majority of former Coal Yard No. 1 area is fairly level, with the outer 20 feet of the southern, western, and northern portions gently dipping in a radial pattern. Surface water runoff percolates into and through the thin residual layer of coal at the coal yard. Surface water runoff on the southern and western portions drains into the unnamed tributary located to the west, while surface water on the northern section drains into the former Ash Pit No. 1.

3.0 Field Activities

3.1 Introduction

Field activities at Coal Yard No. 1 were performed in accordance with the updated and revised SWSAP (Shaw, 2008b) and site-specific sampling and analysis plan (Shaw, 2011a), as noted in Chapter 1.0. Activities included hand auger operation with soil sampling, soil borehole logging, documentation of field work activities (sample collection logs, daily field notes, etc.), surveying, and disposal of IDW.

Prior to any intrusive work, a NASA authorized dig permit was obtained for Coal Yard No. 1. The dig permit process included review of utility maps for any underground utilities, including storm water, sewer, electrical, natural gas, telephone, cable, or fiber optic lines in the area.

3.2 Soil Sampling

In November 2011 (prior to soil sampling), the upper foot of surface soil was removed with a pickax at select locations throughout the former coal yard area to determine optimal placement for the soil borings. Removal of the surface soil aided in determining both the boundary of the former coal yard and the thicknesses of any remaining coal. Soil boring locations were chosen based on the interpreted extent of the former coal yard. Four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed at Coal Yard No. 1 using either a 2-inch or 3-inch stainless-steel hand auger. Soil collected from a sample interval was transferred to a new, resealable storage bag, thoroughly homogenized, and placed into the appropriate sample container. All hand auger activities were conducted by Shaw personnel on December 20, 2011. Figure 2-1 shows the location of the soil borings.

Three soil samples were collected from each soil boring. A surface soil sample was collected from each boring with depths ranging between 0.3 to 1.3 and 1 to 2 feet, depending on the presence and thickness of coal. Two subsurface soil samples from depths of 3 to 5 and 8 to 10 feet below ground surface (bgs) were also collected from each boring and analyzed for nitroaromatics, semivolatile organic compounds (SVOC), and target analyte list (TAL) metals. Also, the surface soil sample and shallower subsurface soil sample (3 to 5 feet) were analyzed for polychlorinated biphenyls (PCB). One of the surface soil samples was analyzed for total organic carbon. Table 3-1 presents a summary of soil samples collected, and soil sample collection logs are included in Appendix A. Continuous lithologic logs were recorded for all soil

borings during the drilling. Hazardous, toxic, and radiological waste drilling logs for each borehole are included in Appendix B.

Each borehole was abandoned after all soil sampling activities at Coal Yard No. 1 were complete. Bentonite granules were emptied into the 10-foot-deep borehole and brought to a depth of approximately 3 feet bgs. Remaining borehole soil from initial hand auger operations was emptied back into the open borehole portion and brought to ground surface.

3.3 Decontamination Procedures

Decontamination of the hand auger and sampling equipment was performed in accordance with Section 5.0 of the SWSAP (Shaw, 2008b). Specifically, sampling equipment was decontaminated by rinsing in sequence with phosphate-free soapy water, tap water, nitric acid, methanol, hexane, and deionized water. The bucket augers were decontaminated prior to each boring.

3.4 Land Survey

After initial site reconnaissance and selection of soil sampling locations (November 2011), an Ohio-registered professional land surveyor surveyed the soil boring locations. Surveying was conducted prior to actual sampling because surveying was being conducted at another PBOW site (Acid Area No. 1) to reduce mobilization and reporting costs. Horizontal coordinates were surveyed to the closest 0.1 foot and referenced to the Ohio State Plane Coordinate System. The land surface elevation was surveyed to the nearest 0.01 foot and referenced to the 1929 National Geodetic Vertical Datum. Land survey data reports are included in Appendix C.

3.5 Investigation-Derived Waste Management

IDW generated during investigation activities included decontamination water and personal protective equipment. All IDW was managed and handled in accordance with procedures described in the SWSAP (Shaw, 2008b).

All decontamination fluids generated during field activities, except the nitric acid, methanol, and hexane rinse, were stored in a labeled 55-gallon drum. Decontamination fluids (nitric acid, methanol, and hexane) were collected in a stainless-steel pan and evaporated to prevent disposal as a hazardous waste liquid. IDW rinse water was drummed and sampled to determine if it should be classified as a hazardous or nonhazardous material. Soil generated during hand auger operations was placed back into the borehole. Personal protective equipment (Tyvek® suits, latex

gloves, etc.) and general refuse were double bagged and disposed in an on-site, Shaw contracted industrial dumpster.

Following analytical determination that the wastewater was nonhazardous, on January 26, 2012, the IDW decontamination water was transported by Triad Transport, Inc. to the Environmental Quality Company in Detroit, Michigan, for disposal. The waste manifest for disposal of the decontamination fluid is shown in Appendix D.

4.0 Analytical Program

The following sections present the analytical program used in this investigation. This review includes the laboratories used for all samples, the analytical methods used, data quality evaluation, and blank analysis. In addition, a description and derivation of RBSCs is presented in Section 4.2.1. The derivation and use of BSCs and the analytical results are presented in Section 4.2.2.

4.1 Analytical Program and Methodologies

4.1.1 Sample Analysis and Data Validation

Primary and quality control (QC) project samples collected in December 2011 were analyzed by Accutest Laboratories of Orlando, Florida. Quality assurance (QA) samples were analyzed by Test America, Inc., Canton, Ohio. Analysis for nitroaromatic field split samples was performed by Test America of Sacramento, California. Shaw performed the data validation. The validation summaries are provided in Appendix E. The analytical results are summarized in Appendix F. Tables of detected hits (Section 4.1.4) data are included in Appendix G. A data quality evaluation is located in Appendix H, and chains of custody used for soil and IDW samples are included in Appendix I.

All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004), the QAPP (Shaw, 2008c), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project data quality objectives (DQO). The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993).

4.1.2 Analytical Methods

Chemical analyses for the investigation were performed in accordance with guidelines detailed in EPA's *Test Methods for Evaluating Solid Waste (SW-846), Physical/Chemical Methods,* Third Edition, September 1986 (EPA, 1986) and subsequent revisions. The soil samples and associated QA/QC samples were analyzed for PCBs, SVOCs, nitroaromatics, and TAL metals. Methods used for analysis are summarized in Table 4-1.

4.1.3 Data Quality Evaluation

The reliability of the sampling and analytical procedures used during the investigation was demonstrated by implementing the project-specific QA procedures specified in the SWSAP (Shaw, 2008b) and the QAPP (Shaw, 2008c) and its site-specific attachments. Successful execution of these procedures provides strong supporting evidence that the data are representative of the areas under investigation.

The DQOs for this project were to produce scientifically valid data of known accuracy and precision that were complete with respect to identified critical samples, comparable with similar data types, and representative of the media sampled so as to be useful for the cited purposes. Evaluation of the data using the DQOs and the data validation process resulted in the determination that the data set is valid and of sufficient quality to meet the objectives of the investigation.

A complete evaluation of the analytical results is given in the data quality evaluation found in Appendix H.

4.1.4 Blank Evaluation

The purpose of blank analysis is to detect contamination resulting from laboratory and field activities. For this site, field blanks were not required. Only laboratory method blanks were analyzed. Blank evaluation involves qualification of data based on the results of the laboratory method blanks. The criteria for blank evaluation are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified "B."

- For inorganics, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."
- If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, no action is taken.

In instances where more than one blank is associated with a given sample, qualification is based upon a comparison with the associated blank having the highest concentration of a contaminant. Blank results are not subtracted from sample concentrations. Note that data with “B” validation qualifiers are included in the Chapter 5.0 tables, but the associated concentrations are not included in the tables’ “maximum detected concentration” column because “B” qualified data are not regarded as detected and are not used in PBOW risk assessments.

4.2 Comparison to Screening Criteria

The analytical result tables presented in Chapter 5.0 include a comparison to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in the tables. RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks will be performed in the BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified in bold type in the Chapter 5.0 result table.

4.2.1 Risk-Based Screening Concentrations

The RBSCs are derived from November 2011 regional screening levels (EPA, 2011) using the methodology described in the Ash Pit No. 1 BHHRA work plan (Shaw, 20011b). Because the area surrounding PBOW is agricultural and residential and because other PBOW sites have been remediated based on unrestricted land use, risk-based screening has been performed based on residential exposure. This assumption is appropriate because the area surrounding the former PBOW facility is rural and residential, and if/when the property is excessed, the land will likely become residential. Soil RBSCs are based on a long-term residential land-use scenario that assumes use by a young child for noncancer effects and use by the combined young child and adult life stages for carcinogenic effects. Together, these capture a plausible case for future land use. The soil RBSCs are based on an incremental lifetime cancer risk of 1E-6 and a hazard quotient of 0.1. As stated in Section 4.2, laboratory analytical results are compared to RBSCs only as a point of reference. Further details on the RBSCs and their derivation are provided in the BHHRA work plan.

4.2.2 Background Screening Concentrations

Derivation and BSC values for PBOW soil are presented in the acid areas site investigation report (IT Corporation, 1998). Table 4-2 presents a complete list for metals in soil. The BSCs were derived from concentrations of these analytes found in PBOW background groundwater monitoring wells and soil data sets. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Each BSC is the calculated 95th percent upper tolerance limit or the maximum detected concentration of the background data set, whichever value is lower, for each relevant analyte (IT Corporation, 1998). It is noted that the method agreed upon for the development of BSCs by OEPA and USACE, as recorded in the September 11, 2002 PBOW team meeting minutes, differs from that shown in current OEPA (2009) guidance. This PBOW team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2009) guidance.

5.0 Investigation Results

On December 20, 2011, four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed within Coal Yard No. 1. Surface soil samples were collected from depths of approximately 0.3 to 1.3, 0.5 to 1.5, or 1 to 2 feet bgs due to the presence of coal on the ground surface, 3 to 5 feet bgs, and 8 to 10 feet bgs. Findings of the soil sampling are discussed in the following sections. Analytical results and conclusions are presented in the following sections.

5.1 Site-Specific Soils

As described in the Ash Pit No. 1 SCR (Shaw, 2010), fill sand had been used at PBOW following demolition and early remediation tasks to cover concrete foundations and demolition scars and to promote a natural landscape appearance. At Coal Yard No. 1, no fill sand of this type was encountered on the surface at any of the four soil borings drilled. The ground surface at two of the four soil borings (CY1-SB01 and CY1-SB03) was covered with a mixture of black sand, silt, and coal to a depth of approximately 0.5 foot. A sand, silt, and coal mixture was slightly less at boring CY1-SB02 with a thickness of only 0.3 foot. At the fourth boring (CY1-SB04), the first 1 foot of surface soil consisted of a mixture of black silt with clay, coal, and sand. Figure 2-1 shows a Coal Yard No. 1 site map with soil boring locations.

Below the silt, clay, sand, and coal surface soil, a layer of yellowish-brown, very fine-grain sand with silt of loose consistency was typically encountered to a depth ranging from 3 to 4 feet. This material could be fill material based upon the depth and uniqueness of a fine-grain sand-silt near the surface. Cinders were encountered in boring CY1-SB01 at a depth of 4 to 6 feet bgs, below the fine-grain sand and silt. A historical photograph dated January 19, 1942 shows that a parking area was present prior to the existence of Coal Yard No. 1. It is possible that this sand with silt was the former parking area, was possibly the base for either the parking area or coal storage, or was used to level the ground surface during construction of the powerhouse.

Native soil is believed to have been encountered in the borings at depths ranging from 3 feet in borings CY1-SB01, CY1-SB03 and CY1-SB04 to 6 feet bgs in boring CY1-SB02. Native soil consisted of glacial till, glacial outwash, or possibly a glacial lacustrine (lake) deposit. In three of the four soil borings (CY1-SB01, CY1-SB03, and CY1-SB04), typically a stiff silt with clay or clay with silt was encountered to the total boring depth of 10 feet. The color of the silt or clay was usually gray except in boring CY1-SB02, where it was an olive brown which gradually changed to a dark yellowish brown at a depth of approximately 8 feet. Depth to groundwater

varied from 0.5 foot bgs in CY1-SB01 to 1.5 feet bgs in boring CY1-SB02, and groundwater was not encountered in the remaining two borings (CY1-SB03 and CY1-SB04).

5.2 Soil Analytical Results

A total of 14 soil samples were collected from the four borings. Four surface soil samples and 10 subsurface samples (including 1 QC and 1 QA sample) were collected from depths of 3 to 5 and 8 to 10 feet bgs. Three of the surface soil samples were collected below a nearly 0.5-foot-thick coal layer while the remaining surface soil sample, CY0012, was collected below a coal layer beginning at a depth of 1 foot bgs. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. Also, the surface soil samples and the 3 to 5 feet bgs interval soil samples were analyzed for PCBs. Table 5-1 summarizes detected concentrations of analytes and compares these concentrations to the RBSCs and/or BSCs.

5.2.1 2011 Surface Soil Samples

No nitroaromatics or PCBs were detected in any of the surface soil samples at Coal Yard No. 1. Five SVOCs (fluoranthene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene) were detected in the surface soil sample from boring CY1-SB04 and only one SVOC (2-methylnaphthalene) was detected in boring CY1-SB03, but all were far below their respective RBSCs.

No TAL metal analytical concentrations exceeded both the RBSC and BSC limits in surface soil samples at Coal Yard No. 1.

Total organic carbon was measured in the surface soil at a concentration of 0.27 milligrams per kilogram (mg/kg).

5.2.2 2011 Subsurface Soil Samples

No nitroaromatics or PCBs were detected in the subsurface soil samples at Coal Yard No. 1. The SVOCs dibenzofuran, fluoranthene, fluorene, and pyrene were detected in the 3 to 5 feet bgs subsurface soil sample CY0005 from boring CY1-SB02 and the SVOCs 2-methylnaphthalene, naphthalene, and phenanthrene were detected in the QA (field split) sample CY0010 from boring CY1-SB03. All results were below the respective RBSCs.

Only one TAL metal, thallium, was detected above both the RBSC and BSC. Thallium was found in the 3 to 5 feet subsurface soil sample CY0010 (QA sample) from boring CY1-SB03 at a concentration of 1.5 mg/kg, slightly greater than the RBSC of 0.078 mg/kg and BSC value of 1.3 mg/kg.

6.0 Summary and Conclusions

To determine possible contamination to soil caused by the storage of coal, four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed within Coal Yard No. 1.

Field activities at Coal Yard No. 1 were conducted in November and December 2011 and included hand auger operation, soil sample collection, lithologic logging, documentation, and surveying of boring locations. Disposal of IDW occurred in January 2012. A total of 4 surface soil and 10 subsurface soil (including 1 QA and 1 QC sample) samples were collected. Surface soil samples were collected from depths of either 0.3 to 1.3, 0.5 to 1.5, or 1 to 2 feet bgs (immediately below the existing coal layer), and subsurface soil samples were collected from depths of 3 to 5 and 8 to 10 feet bgs. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. In addition, surface soil and 3 to 5 feet interval samples were analyzed for PCBs. Analytical results obtained from each soil sample were screened against RBSC and BSC values. RBSC values do not infer a regulatory limit or mandated cleanup level, nor does an exceedance necessarily represent an unacceptable human health risk. They are used in this report only as points of reference.

Major findings from Coal Yard No. 1 soil sample results are summarized as follows:

- No nitroaromatics or PCBs were detected in surface or subsurface soil samples.
- Only one SVOC was detected in one of the three surface soil samples (CY0007) and five SVOCs were detected in the surface soil sample (CY0012). None of the SVOCs detected were above their respective RBSCs in any surface or subsurface soil sample.
- A total of seven SVOCs were detected in 2 of the 10 subsurface soil samples, and results of each were below their respective RBSCs.
- Only one TAL metal (thallium) was detected above both the RBSC and BSC value in one subsurface soil sample. Thallium was detected at a concentration of 1.5 mg/kg in the 3- to 5-foot field split (QA) sample (CY0010) from boring CY1-SB01, marginally above the BSC (1.3 mg/kg). This exceedance is questionable because thallium was detected at a concentration (0.41 mg/kg) that is well below the BSC in the regular sample from this location (CY0008), and it was not detected in the associated field split (QC) sample (CY0009).
- Total organic carbon in the surface soil sample from boring CY1-SB01 was detected at a concentration of 0.27 mg/kg.

The soil data collected from Coal Yard No. 1 do not indicate an appreciable impact due to the former storage of coal at the site.

7.0 Recommendations

The surface and subsurface soil of Coal Yard No. 1 appears to be adequately characterized. With the exception of thallium, none of the analytes exceeded both the corresponding RBSC and the BSC values. Thallium only marginally exceeded the BSC in the field split (QA) sample from a single location and was not detected above the BSC in either the regular sample or field duplicate (QC) sample. Therefore, no BHHRA is needed because all analytes would be screened out, leaving no chemicals of potential concern for evaluation. Ecological risks will be discussed in the remedial investigation report, which will describe that based on low concentrations of analytes in Coal Yard No. 1, no screening-level ecological risk assessment is required.

Planned Activities. Completion of a remedial investigation report, which is anticipated for completion in 2013.

8.0 References

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TABLES

Table 3-1

Summary of Soil Samples Collected
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
SS	CY1-SB01	CY0001	20-Dec-11	REG	F88938
DS	CY1-SB01	CY0002	20-Dec-11	REG	F88938
DS	CY1-SB01	CY0003	20-Dec-11	REG	F88938
SS	CY1-SB02	CY0004	20-Dec-11	REG	F88938
DS	CY1-SB02	CY0005	20-Dec-11	REG	F88938
DS	CY1-SB02	CY0006	20-Dec-11	REG	F88938
SS	CY1-SB03	CY0007	20-Dec-11	REG	F88938
DS	CY1-SB03	CY0008	20-Dec-11	REG	F88938
DS	CY1-SB03	CY0009	20-Dec-11	FD	F88938
DS	CY1-SB03	CY0010	20-Dec-11	FS	240-7168-1
DS	CY1-SB03	CY0011	20-Dec-11	REG	F88938
SS	CY1-SB04	CY0012	20-Dec-11	REG	F88938
DS	CY1-SB04	CY0013	20-Dec-11	REG	F88938
DS	CY1-SB04	CY0014	20-Dec-11	REG	F88938

Notes:

SDG - Sample delivery group.

SS - Surface soil.

CY1 - Coal Yard No. 1.

REG - Regular sample.

FD - Field duplicate. Sample sent to same laboratory as primary samples.

FS - Field split. Sample sent to independent laboratory other than primary contract laboratory.

DS - Deep soil (subsurface).

Table 4-1

Summary of Soil and Groundwater Analytical Parameters and Methods for Soil
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Matrix	Analytical Parameters[a]	Analytical Method[b]
Soil	TCL Semivolatile Organic Compounds	SW-846 3550C/8270D
	Nitroaromatic Compounds	SW-846 8330A
	Polychlorinated Biphenyls	SW-846 3550C/8082A
	TAL Metals	SW-846 3050B/6010C/7471B
	Total Organic Carbon	Walkley-Black
Liquid IDW	Target Compound List Volatile Organic Compound	SW-846 8260B
	Target Compound List Semivolatile Organic Compound	SW-846 3510C/8270D
	Nitroaromatics	SW-846 8330A
	Total Recoverable Metals	SW-846 3010A/6010C/7470A
	Ignitability	SW-846 1010A
	pH	SW-846 9040C
	Corrosivity	SW-846 1110A
	Reactive Cyanide	7.3.3/7.3.4
	Reactive Sulfide	7.3.3/7.3.4
Soil IDW	TCLP Volatile Organic Compounds	SW-846 1311/8260B
	TCLP Semivolatile Organic Compounds	SW-846 1311/3510C/8270C
	TCLP Metals	SW-846 1311/3010A/6010C/7470A
	Ignitability	SW-846 1010A
	Corrosivity	SW-846 1110A
	Reactivity	7.3.3.2/7.3.4.2

[a]Target analyte list (TAL) and target compound list (TCL) are used to designate parameter lists with no requirements for Contract Laboratory Program method quality control or data reporting packages.
[b]Analyses found in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* EPA Publication, Third Edition, and *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, March 1983 and subsequent revisions, except as noted.
[c]Water quality parameter.
[d]Field testing will use an appropriate field test kit or method according to EPA 600/4-79-020: Method for Chemical Analysis of Water and Wastes in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication, Third Edition.

IDW - Investigation-derived waste.
SCR - Site characterization report.
TCLP - Toxicity characteristic leaching procedure.
TOC - Total organic carbon.

Table 4-2

Background Screening Concentrations of Metals in Soil[a]
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Criterion [c]
Aluminum	12 / 12	3520 - 15500	NA	L	8.43E+03	2.69E+04	1.55E+04
Antimony	9 / 25	5.9 - 9.3	5.4 - 74	NP	4.68E+00	NA	9.30E+00
Arsenic	23 / 26	2.1 - 36.5	1.2 - 3.7	L	1.08E+01	7.10E+01	3.65E+01
Barium	9 / 12	35.6 - 826	23.2 - 24.7	L	1.16E+02	1.30E+03	8.26E+02
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00E+00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	NA	L	1.13E+04	2.18E+05	5.23E+04
Chromium	25 / 26	4.4 - 29	12.3 - 12.3	NP	1.34E+01	NA	2.90E+01
Cobalt	9 / 12	9.6 - 116	5.8 - 6.2	L	2.26E+01	2.48E+02	1.16E+02
Copper	23 / 26	2.3 - 56.2	2.2 - 2.9	L	1.70E+01	1.47E+02	5.62E+01
Iron	12 / 12	5880 - 234000	NA	L	4.01E+04	3.58E+05	2.34E+05
Lead	26 / 26	1.9 - 48.6	NA	L	1.28E+01	5.13E+01	4.86E+01
Magnesium	12 / 12	629 - 10400	NA	L	3.26E+03	3.08E+04	1.04E+04
Manganese	26 / 26	21 - 13300	NA	L	7.29E+02	3.51E+03	3.51E+03
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	8.50E-02
Nickel	26 / 26	5.4 - 55.1	NA	L	2.28E+01	7.79E+01	5.51E+01
Potassium	11 / 12	579 - 3390	617 - 617	L	1.24E+03	6.08E+03	3.39E+03
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00E+00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	1.11E+01
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30E+00
Vanadium	11 / 12	9 - 40.9	61.7 - 61.7	L	2.48E+01	8.31E+01	4.09E+01
Zinc	26 / 26	6.6 - 655	NA	L	7.30E+01	3.22E+02	3.22E+02

mg/kg - Milligrams per kilogram.
NA - Not applicable; not available.
[a] Data used to determine soil background are based on sampling from IT Corporation, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio.*
[b] 95% UTL - 95 percent upper tolerance limit rounded to three significant figures.
[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95 percent UTL or the maximum detected concentration, whichever is less, is used.
Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Table 5-1

Detected Constituents Above RBSCs and/or BSCs in Surface and Subsurface Soil at Coal Yard No. 1
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY1-SB01						CY1-SB02						CY1-SB03									
				SAMPLE NO	CY0001		CY0002		CY0003		CY0004		CY0005		CY0006		CY0007		CY0008		CY0009		CY0010		CY0011	
				DATE	12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011	
				DEPTH	0.5 - 1.5 Ft		3 - 5 Ft		8 - 10 Ft		0.3 - 1.3 Ft		3 - 5 Ft		8 - 10 Ft		0.5 - 1.5 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-	-	-	0.103	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	-	-	-	-	-	-	-	-	0.138	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-	-	-	0.105	J	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	-	-	-	-	-	-	-	-	-	-	-	-	0.0264	J	-	-	-	-	0.025		-	-
Naphthalene	mg/kg	3.6	NE	0.183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02		-	-
Phenanthrene	mg/kg	NE	NE	0.0255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009		-	-
Pyrene	mg/kg	170	NE	0.124	-	-	-	-	-	-	-	-	0.124	J	-	-	-	-	-	-	-	-	-	-	-	-
METALS																										
Aluminum	mg/kg	7,700	15,500	13,100	4,660		10,100		11,000		2,030		6,020		9,910		5,020		11,400		13,100		10000		6,900	
Antimony	mg/kg	3.1	9.3	1.4	0.12	J	-	-	-	-	0.14	J	0.23	J	-	-	-	-	-	-	-	-	1.4	J	-	-
Arsenic	mg/kg	0.39	36.5	34.6	3.1		7.9		8.4		34.6		3.8		7		9		12.5		10.1		19		5.9	
Barium	mg/kg	1,500	826	100	18.5		73.8		79.7		23.9		44		62.7		31.6		84.6		79.8		100		53.6	
Beryllium	mg/kg	16	1	0.67	0.24	J	0.52		0.58		0.061	J	0.5		0.62	J	0.32		0.63		0.67		0.51		0.36	
Cadmium	mg/kg	7	NE	0.8	-	-	0.15	J	0.33	J	-	-	0.52		0.46	J	0.17	J	0.33	J	0.38	J	-	-	-	-
Calcium	mg/kg	NE	52,300	50,000	727		5,470		13,800		447		4,140		3,230		2,340		3,110		2,910		2,600		50,000	
Chromium	mg/kg	NE	29	20.1	7.8		15.4		17.1		3.9		10.7		15.3		8.7		17.8		20.1		18		14.5	
Cobalt	mg/kg	2.3	116	18	3.1		8.3		18		0.79	J	9.5		14.1		3.3		14.1		15.7		11		6.4	
Copper	mg/kg	310	56.2	30	6		19.4		24.9		3.3		18.3		18.1		7.5		24.8		26.7		30		17.6	
Iron	mg/kg	5,500	234,000	43,000	8,320		18,800		22,300		7,840		17,300		17,100		12,700		26,000		20,700		43,000		13,200	
Lead	mg/kg	40	48.6	29.8	4.8		10.7		11.8		5.5		29.8		10.3		7.2		12.8		10.6		14		12.5	
Magnesium	mg/kg	NE	10,400	12,500	614		3,710		6,100		274		1,180		2,260		1,090		3,950		3,710		3,100	B	**12,500**	
Manganese	mg/kg	180	3,506	721	30.6		316		721		23.7		188		401		148		230	J	461	J	290		249	
Mercury	mg/kg	1	0.09	0.076	0.013	J	0.021	J	0.019	J	0.022	J	0.037	J	0.076	J	0.034	J	0.02	J	0.031	J	0.022	J	0.015	J
Nickel	mg/kg	150	55.1	39	7.8		23.1		36		2.3		13.6		34.1		9.4		37.2		39		36		17.5	
Potassium	mg/kg	NE	3,390	1,550	212	J	744	J	1,550		202	J	435	J	770	J	400	J	1,390		1,210		1,000		1,220	
Selenium	mg/kg	39	2	0.53	-	-	-	-	0.53	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	115	-	-	-	-	-	-	111	J	-	-	-	-	111	J	-	-	-	-	-	-	115	J
Thallium	mg/kg	0.078	1.3	1.5	-	-	-	-	0.29	J	-	-	-	-	-	-	-	-	0.41	J	-	-	**1.5**	J	-	-
Vanadium	mg/kg	39	40.9	30	15.4		25.2		21.8		8		18.1		18.7		16.6		23.2		28.9		30		14.7	
Zinc	mg/kg	2,300	321.75	163	21.3		43.9		57.6		9.4		157		163		21.1		57		62.9		74		50.5	
GENERAL CHEMISTRY																										
Total organic carbon	Percent	NE	NE	0.27	0.27		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-1

Detected Constituents Above RBSCs and/or BSCs in Surface and Subsurface Soil at Coal Yard No. 1
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY1-SB04					
				SAMPLE NO	CY0012		CY0013		CY0014	
				DATE	12/20/2011		12/20/2011		12/20/2011	
				DEPTH	1 - 2 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	0.0313	J	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	0.0334	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.183	0.183	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0255	0.0255	J	-	-	-	-
Pyrene	mg/kg	170	NE	0.124	0.0309	J	-	-	-	-
METALS										
Aluminum	mg/kg	7,700	15,500	13,100	5,480		8,830	J	8,400	
Antimony	mg/kg	3.1	9.3	1.4	0.17	J	0.13	J	0.16	J
Arsenic	mg/kg	0.39	36.5	34.6	24.6		8.4	J	8.3	
Barium	mg/kg	1,500	826	100	46.5		55.1	J	42.5	
Beryllium	mg/kg	16	1	0.67	0.26	J	0.44	J	0.41	
Cadmium	mg/kg	7	NE	0.8	0.8		0.57	J	0.65	
Calcium	mg/kg	NE	52,300	50,000	1,080		19,800	J	26,500	
Chromium	mg/kg	NE	29	20.1	13		13	J	12.1	
Cobalt	mg/kg	2.3	116	18	3.3	J	9.7	J	6.5	
Copper	mg/kg	310	56.2	30	12		19.9	J	19	
Iron	mg/kg	5,500	234,000	43,000	31,700		19,100	J	15,200	
Lead	mg/kg	40	48.6	29.8	7.6		11.4		12.1	
Magnesium	mg/kg	NE	10,400	12,500	748		8,220	J	6,880	
Manganese	mg/kg	180	3,506	721	93.6		279	J	217	
Mercury	mg/kg	1	0.09	0.076	0.049	J	0.018	J	0.015	J
Nickel	mg/kg	150	55.1	39	9.8		24.7	J	19.9	
Potassium	mg/kg	NE	3,390	1,550	716		1,280	J	1,470	
Selenium	mg/kg	39	2	0.53	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	0.074	J	-	-	-	-
Sodium	mg/kg	NE	NE	115	89.5	J	92.3	J	96.7	J
Thallium	mg/kg	0.078	1.3	1.5	0.64	J	0.38	J	-	-
Vanadium	mg/kg	39	40.9	30	22.8		17.1	J	14.3	
Zinc	mg/kg	2,300	321.75	163	27.9		44.7	J	37.5	
GENERAL CHEMISTRY										
Total organic carbon	Percent	NE	NE	0.27	-	-	-	-	-	-

mg/kg - Milligrams per kilogram.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
BSC - Background screening concentration.
MDC - Maximum detected concentration for the area of concern.
Shaded cell indicates value is greater than RBSC.
Bolded text indicates values are greater than BSC.
NE - Not established (RBSCs), not evaluated (BSCs).
"-" - Not detected.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

FIGURES

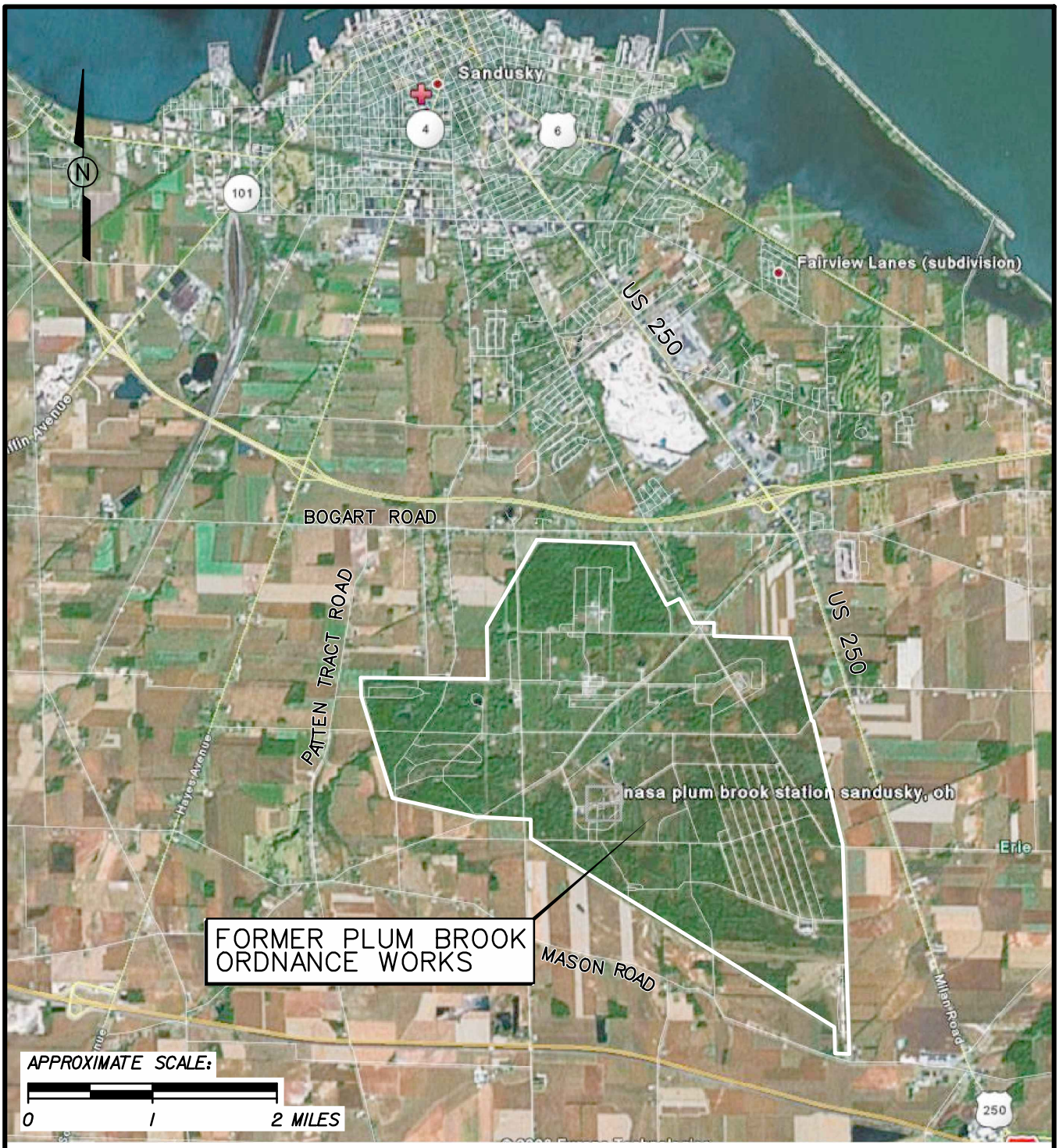

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 1 AND ASH PIT 3 SCR
ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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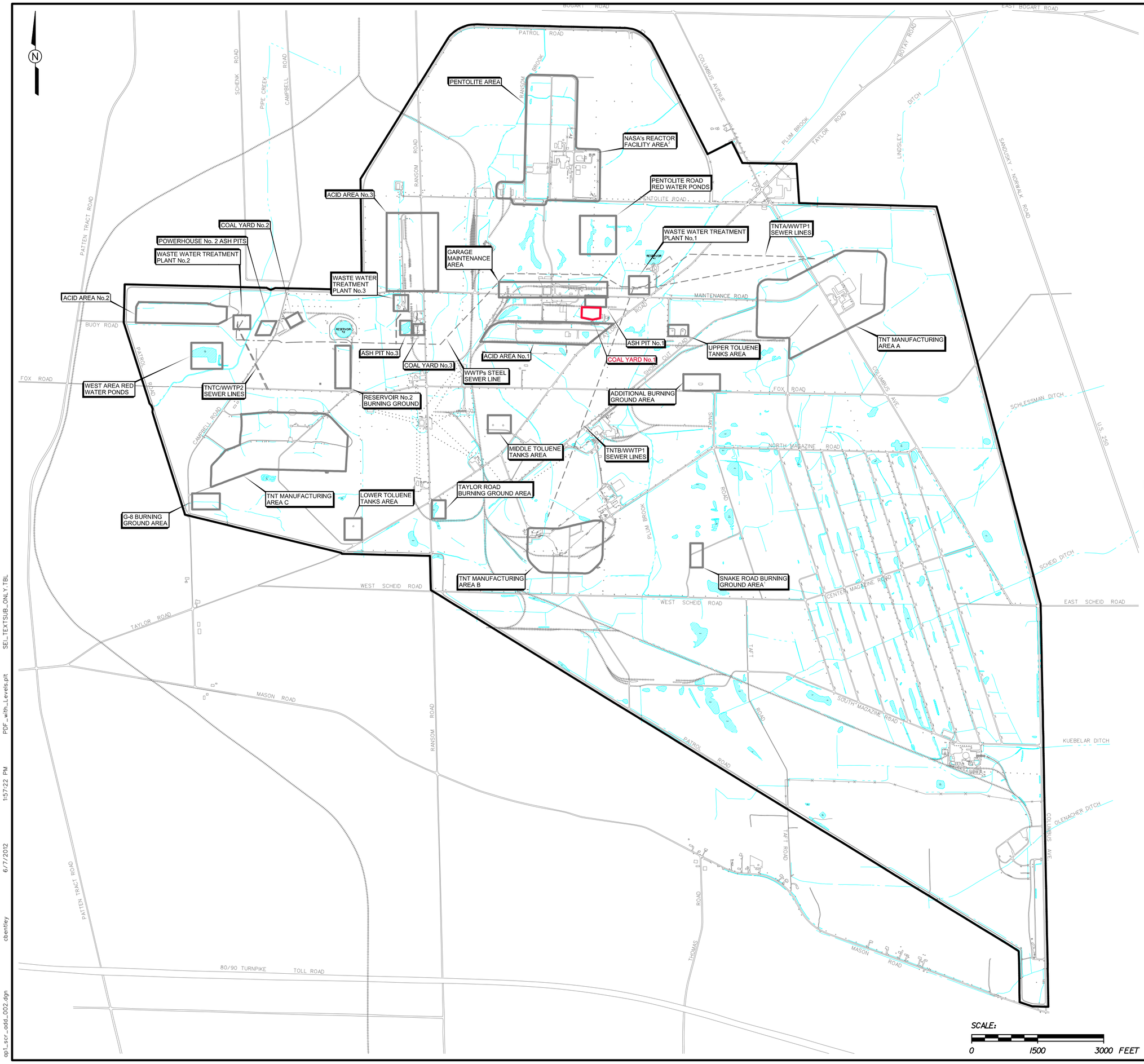

LEGEND:

- AREA OF CONCERN
- APPROXIMATE LOCATION OF SEWER LINES
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

SCALE:

0 1500 3000 FEET

FIGURE 1-2
LOCATION OF COAL YARD No.1 AT PBOW

ASH PIT 1 AND ASH PIT 3 SCR ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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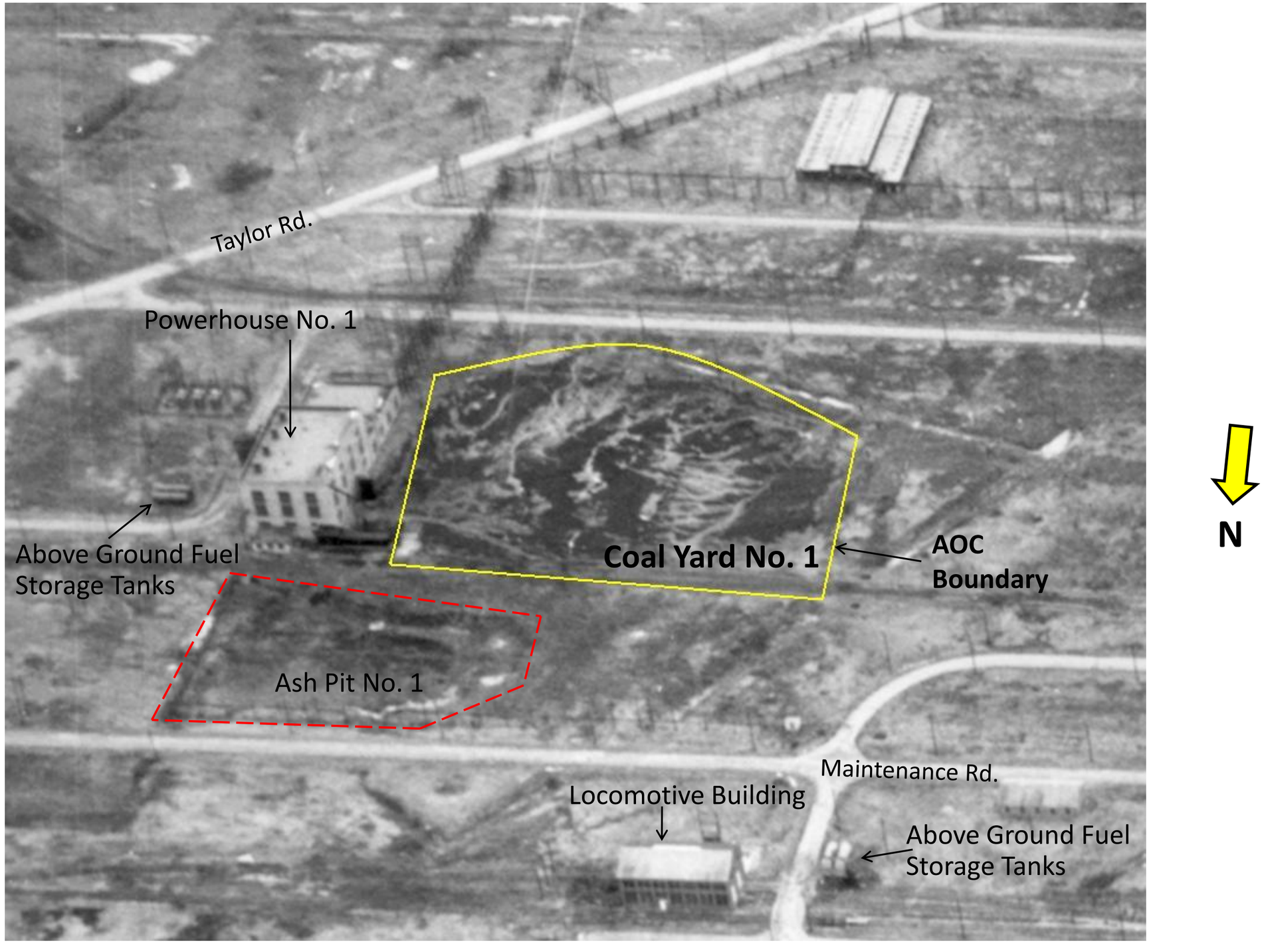
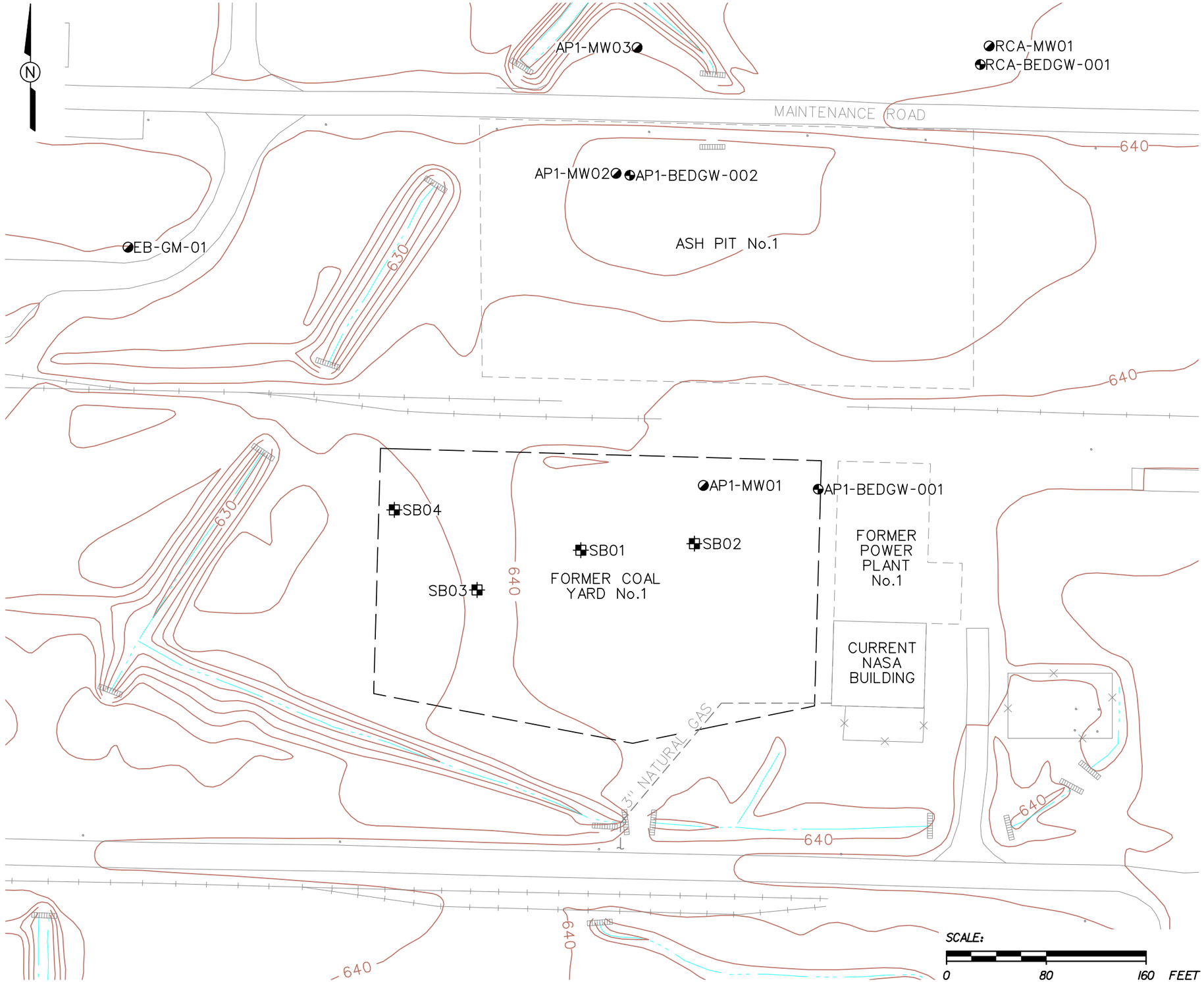


Figure 1-3
Coal Yard No. 1, Circa 1958 Photo (view is to the South)



LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES
- APPROXIMATE HISTORICAL COAL STORAGE PERIMETER BASED ON AERIAL PHOTO
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTEVAL)

FIGURE 2-1
GENERAL SITE FEATURES OF COAL YARD No.1 WITH SITE TOPOGRAPHY AND SAMPLE LOCATIONS

ASH PIT 1 AND ASH PIT 3 SCR ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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APPENDIX A

SOIL BORING SAMPLE COLLECTION LOGS

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB01
Sample Number: CY0001
Sample Name: PB11-SS-CY1-SB01-CY0001-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel bucket auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: ~~EW 1105~~ 1100
Start Depth: ~~EW 0.2'~~ 0.5'
End Depth: ~~EW 1.2'~~ 1.5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/EW/KB

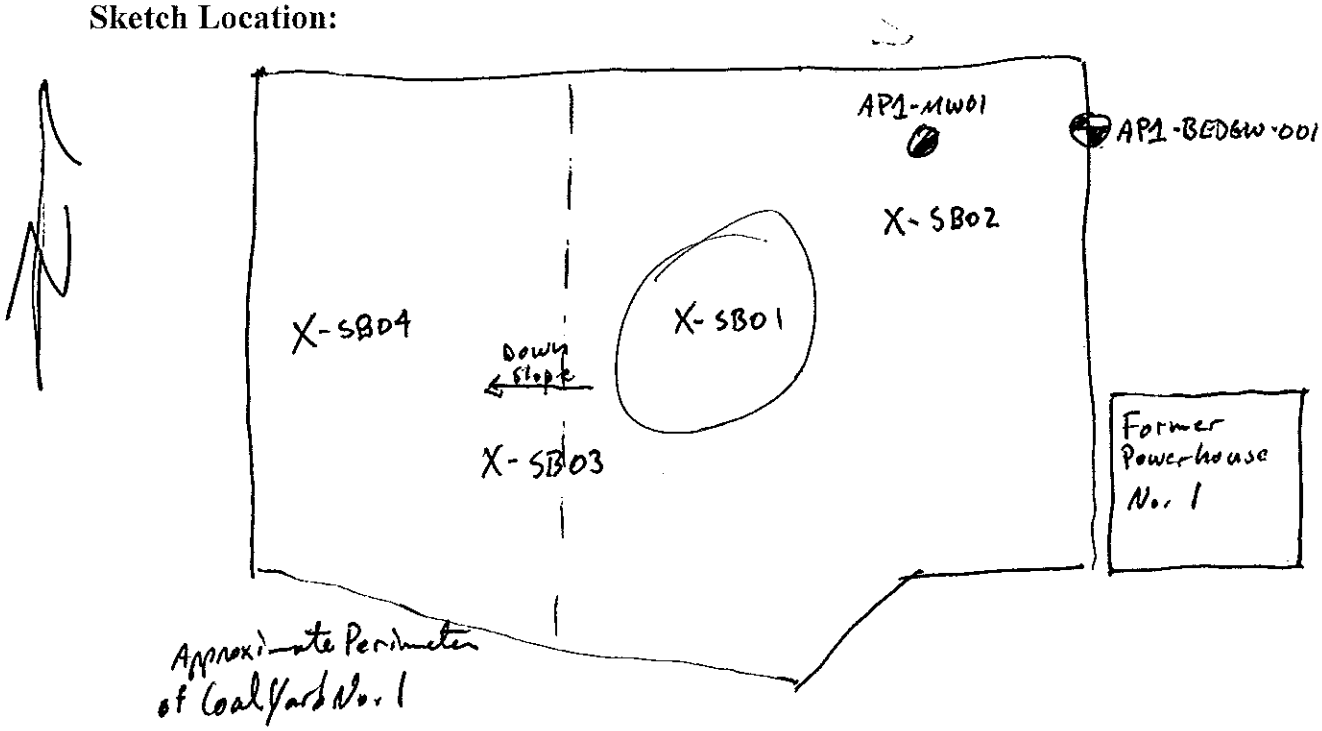
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM
TOC	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1/23/2012

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB01
Sample Number: CY0002
Sample Name: PB11-DS-CYA-SB01-CY0002-~~(0-1)~~ 3-5'-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel bucket auger,

Task: GMA_OCT2011
Collection Date: ~~12-20-11~~ 12-20-11
Collection Time: ~~1119~~ 1115
Start Depth: ~~3'~~ 3'
End Depth: ~~8'~~ 5'
Sample Matrix: SOIL
Sample Team: GW/~~SB~~ GW/KB

QC Partners:
(TB) (ER) (FB)

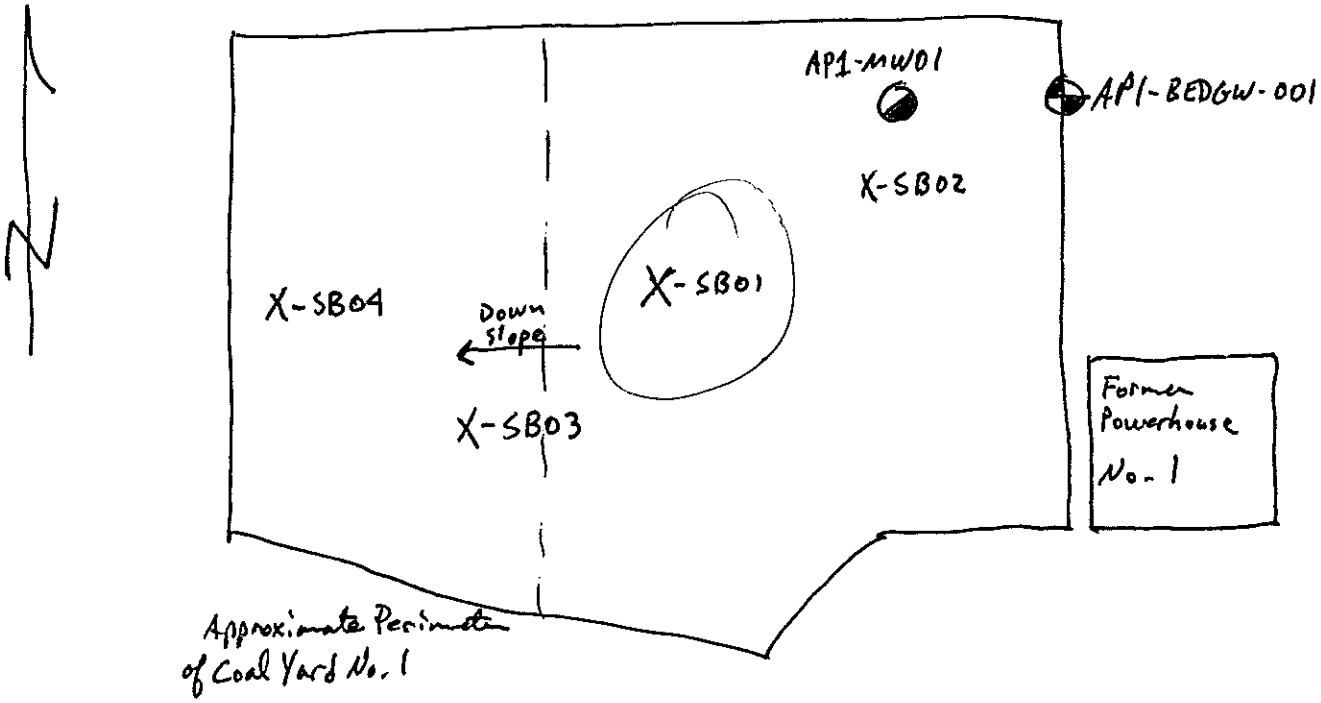
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: L. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: CY1-SB01
Sample Number: CY0003
Sample Name: PB11-DS-CY1-SB01-CY0003-(8-10)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: ~~12-19-11~~ 12-20-11
Collection Time: ~~1140~~ 1145
Start Depth: 8'
End Depth: 10'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

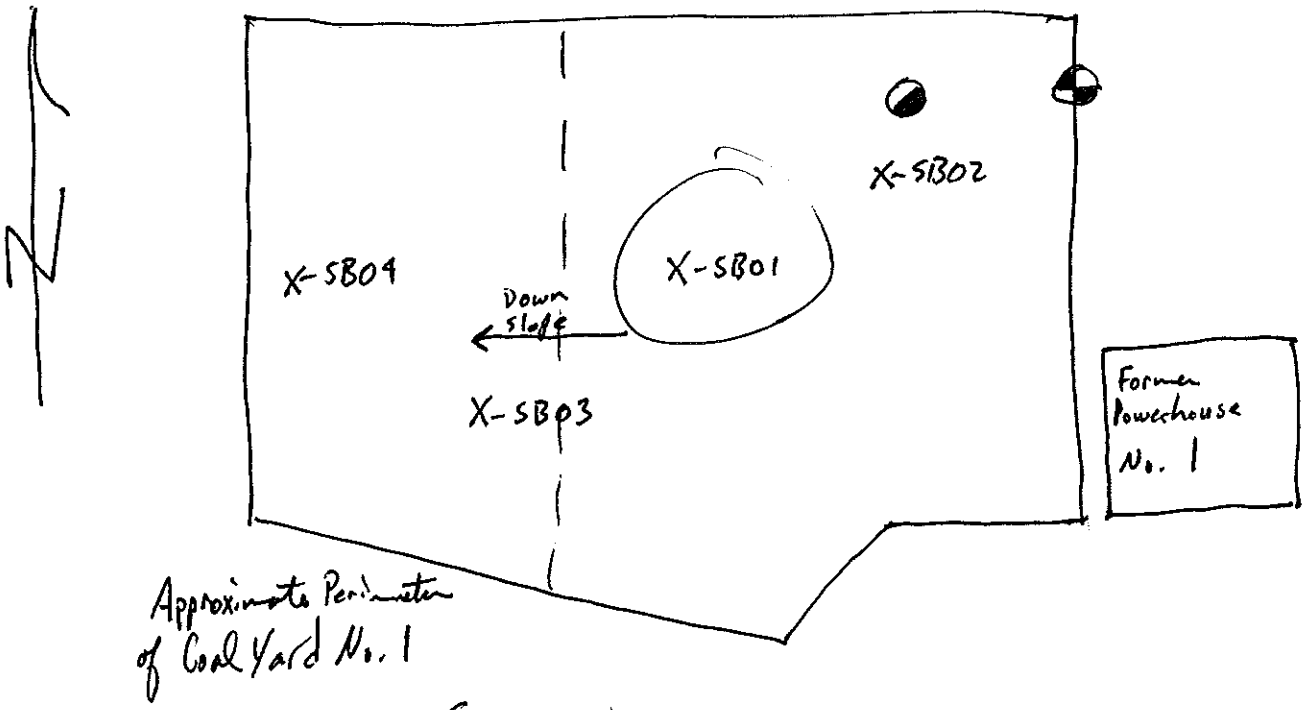
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E. W. Weaver 12-2011

Reviewed BY / Date: Edward S. Nixon 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02
Sample Number: CY0004
Sample Name: PB11-SS-CY1-SB02-CY0004-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1000
Start Depth: 0.3
End Depth: 1.3
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

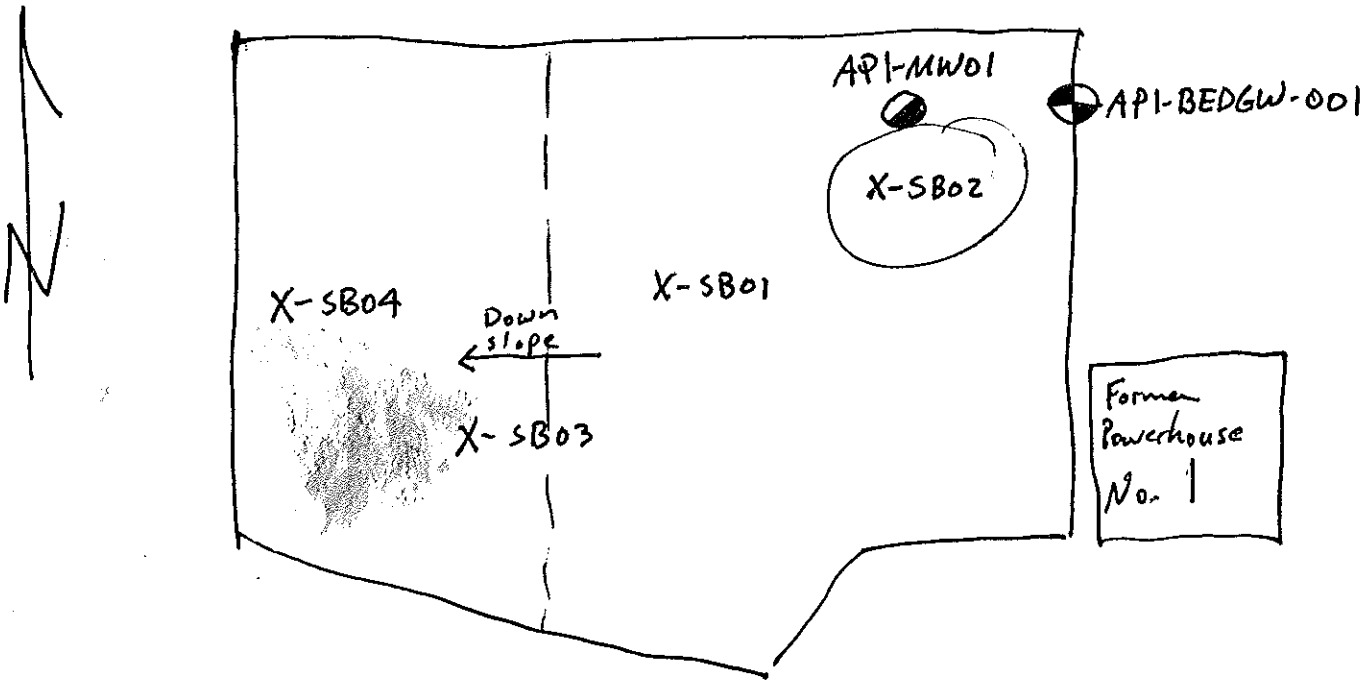
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02
Sample Number: CY0005
Sample Name: PB11-DS-CY1-SB02-CY0005-(3-5)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1015
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

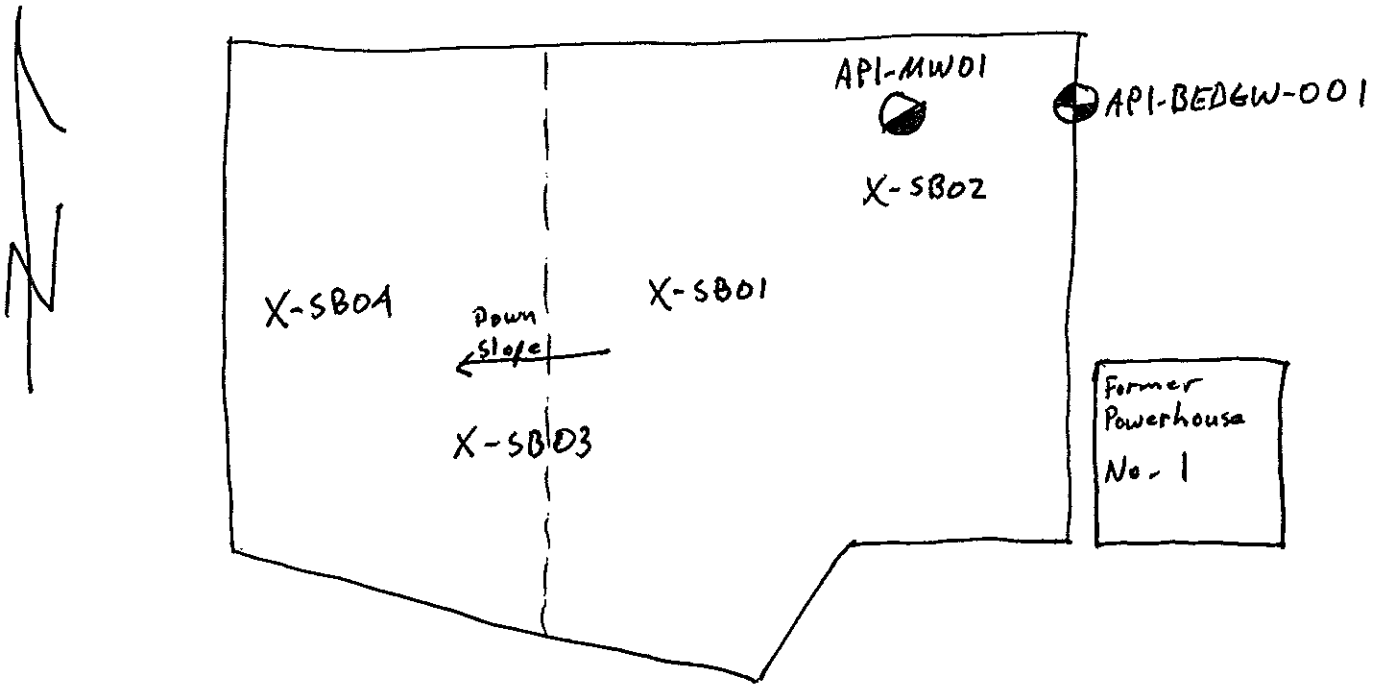
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02

Sample Number: CY0006

Sample Name: PB11-DS-CY1-SB02-CY0006-(8-10)-REG

Sampling Method: SS

Sample Type: DS *Sample Purpose:* REG

Sampling Equip: Stainless Steel Bucket Auger

QC Partners:

(TB) (ER) (FB)

Task: GMA_OCT2011

Collection Date: 12-20-11

Collection Time: 1042

Start Depth: 8'

End Depth: 10'

Sample Matrix: SOIL

Sample Team: EW/KB

ERPIMS Values:

Sacode:

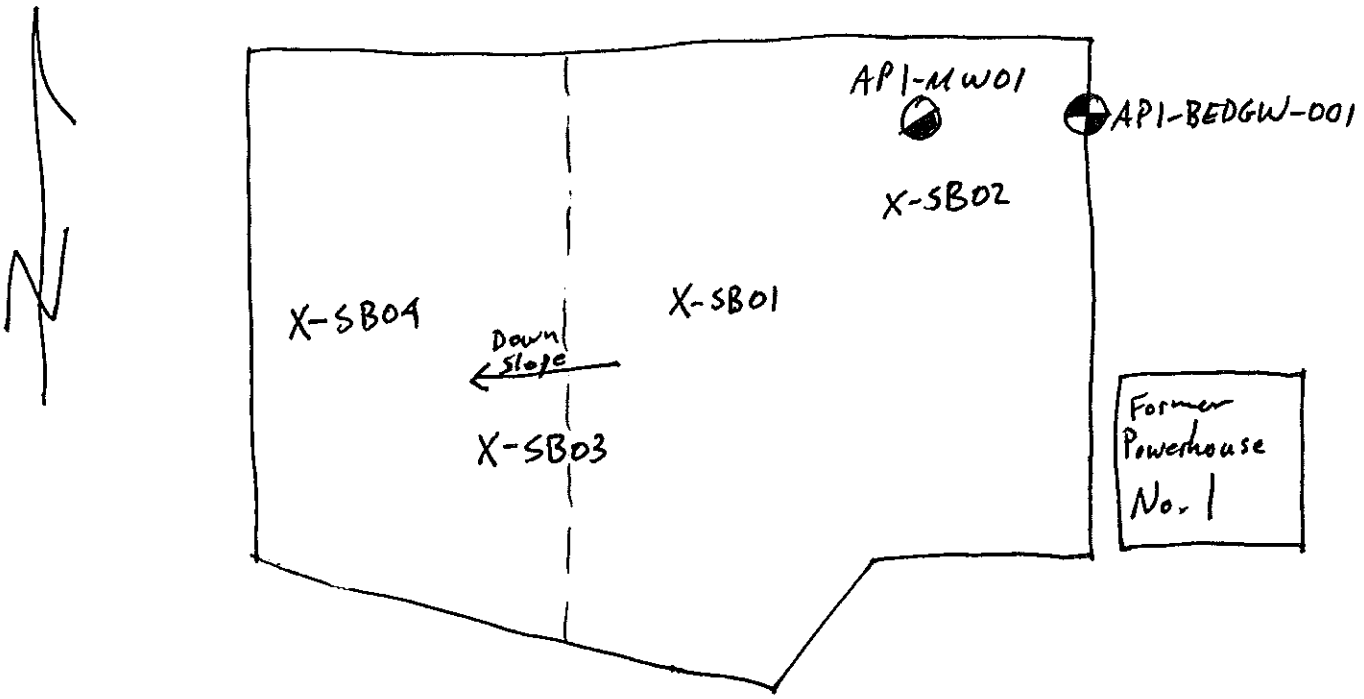
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB03
Sample Number: CY0007
Sample Name: PB11-SS-CY1-SB03-CY0007-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1155
Start Depth: 0.5'
End Depth: 1.5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

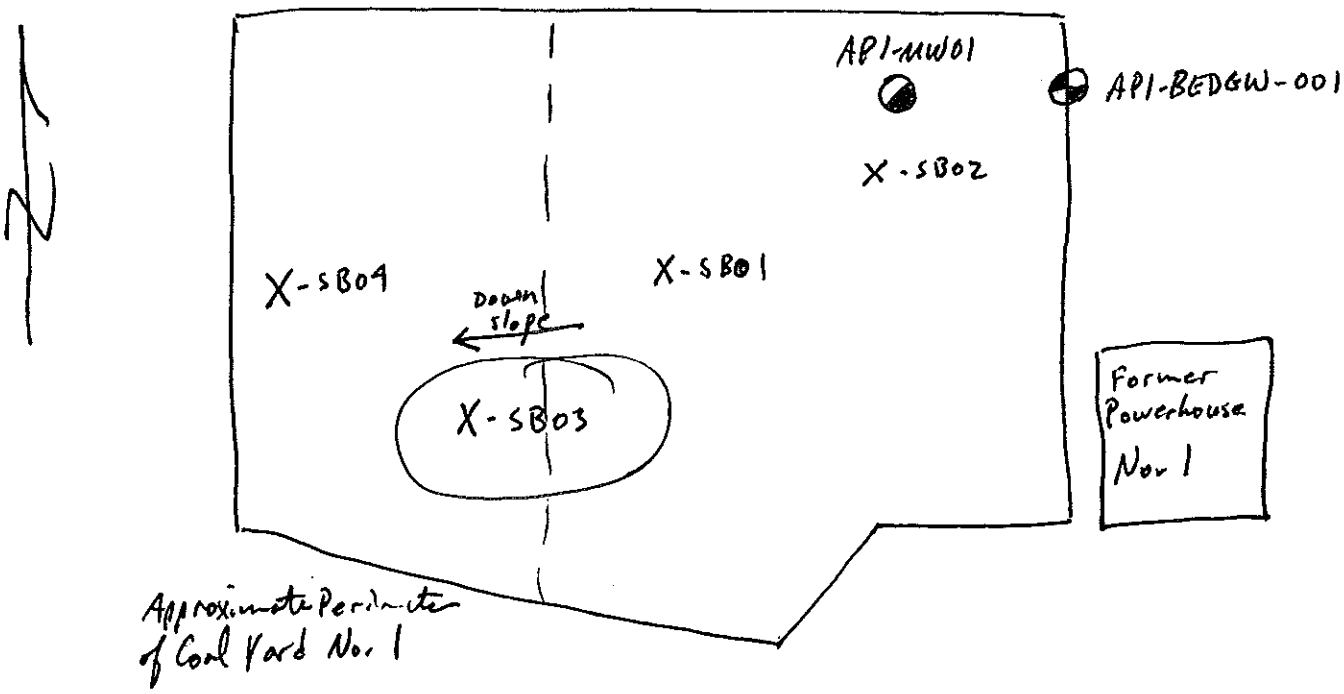
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: Eric W. Weaver 12-20-11 *Reviewed BY / Date:* Edward S. Weaver 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB03
Sample Number: CY0008
Sample Name: PB11-DS-CY1-SB03-CY0008-(3-5)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1205
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

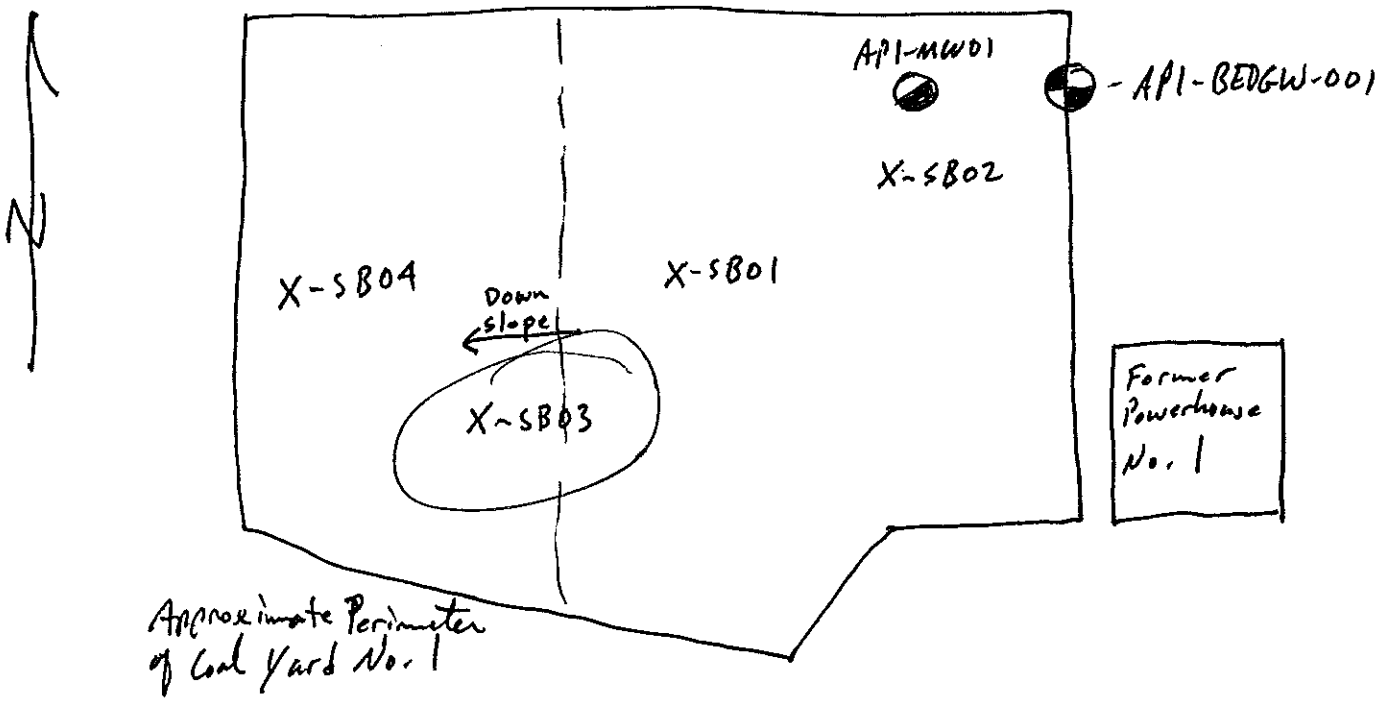
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected FD (CY0009) and FS (CY0010) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11

Reviewed BY / Date: Edward Scribner 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: **CY1-SB03**

Sample Number: **CY0009**

Sample Name: **PB11-DS-CY1-SB03-CY0009-(3-5)-FD**

Sampling Method: **SS**

Sample Type: **DS** *Sample Purpose:* **FD**

Sampling Equip: Stainless Steel Bucket Auger

QC Partners:

(TB) (ER) (FB)

Task: **GMA_OCT2011**

Collection Date: 12-20-11

Collection Time: 1205

Start Depth: 3'

End Depth: 5'

Sample Matrix: **SOIL**

Sample Team: EW/KB

ERPIMS Values:

Sacode:

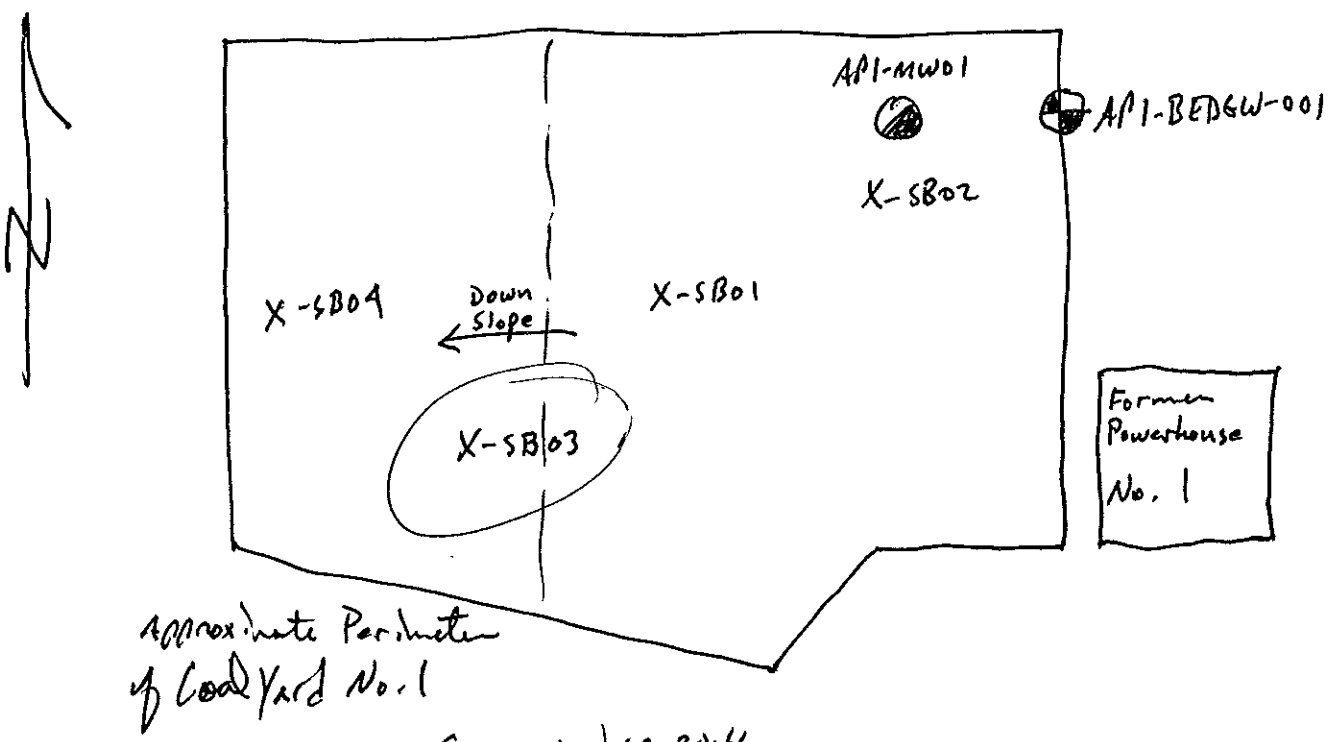
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

Comments: Also collected regular sample (CY0008) and FS (CY0010) at this location.

Sketch Location:



Logged BY / Date: Eric W. Power 12-20-11

Reviewed BY / Date: Edward S. Wilson 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111TA

Location Code: CY1-SB03
Sample Number: CY0010
Sample Name: PB11-DS-CY1-SB03-CY0010-(3-5)-FS
Sampling Method: SS
Sample Type: DS *Sample Purpose:* FS
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1205
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

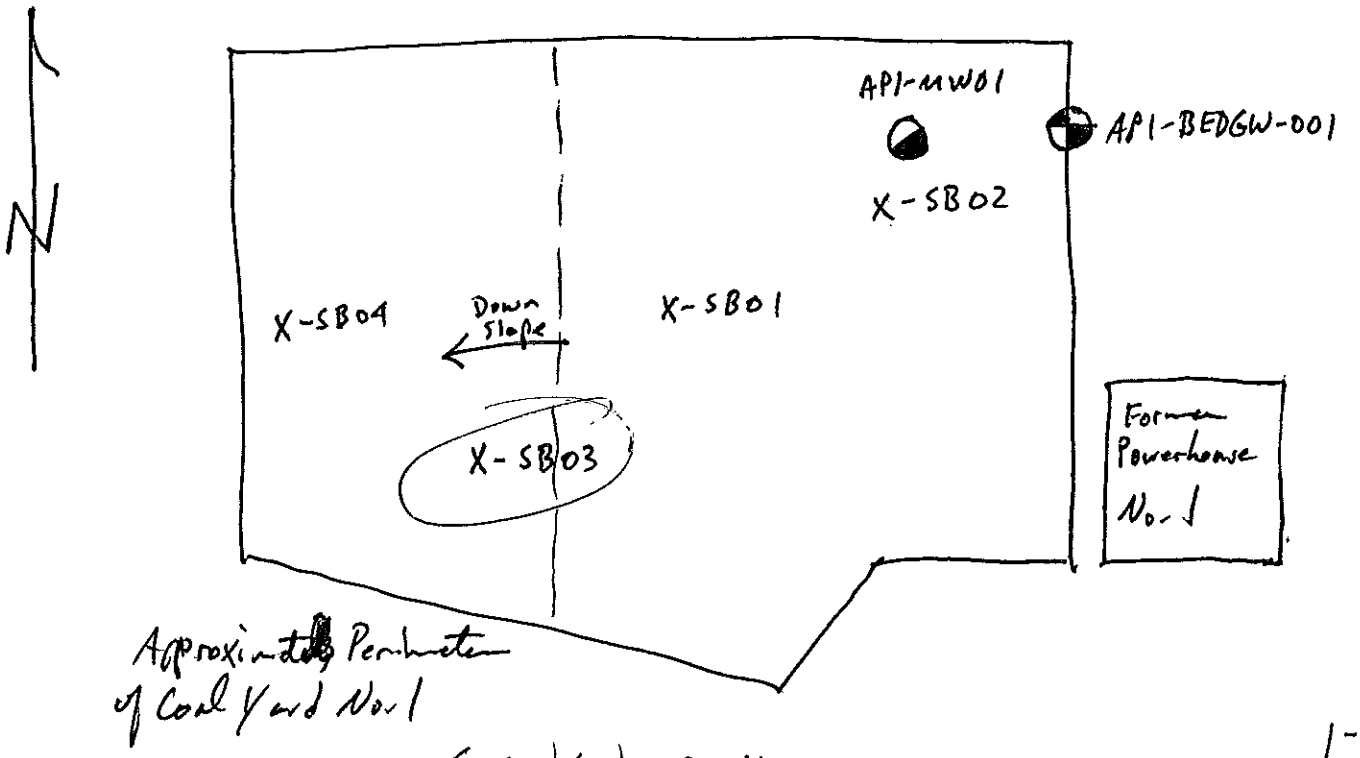
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS3	N	B	1	8	oz	CWM
PCB3	N	B	1	8	oz	CWM
SEMIVOLATILES3	N	B	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0008) and FD (CY0009) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward S. Meaux 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: CY1-SB03

Sample Number: CY0011

Sample Name: PB11-DS-CY1-SB03-CY0011-(8-10)-REG

Sampling Method: SS

Sample Type: DS *Sample Purpose:* REG

Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011

Collection Date: 12-20-11

Collection Time: ~~EW 1242~~ 1225

Start Depth: ~~EW 6.0'~~ 8'

End Depth: ~~EW 8.0'~~ 10'

Sample Matrix: SOIL

Sample Team: EW/KB

QC Partners:

(TB) (ER) (FB)

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

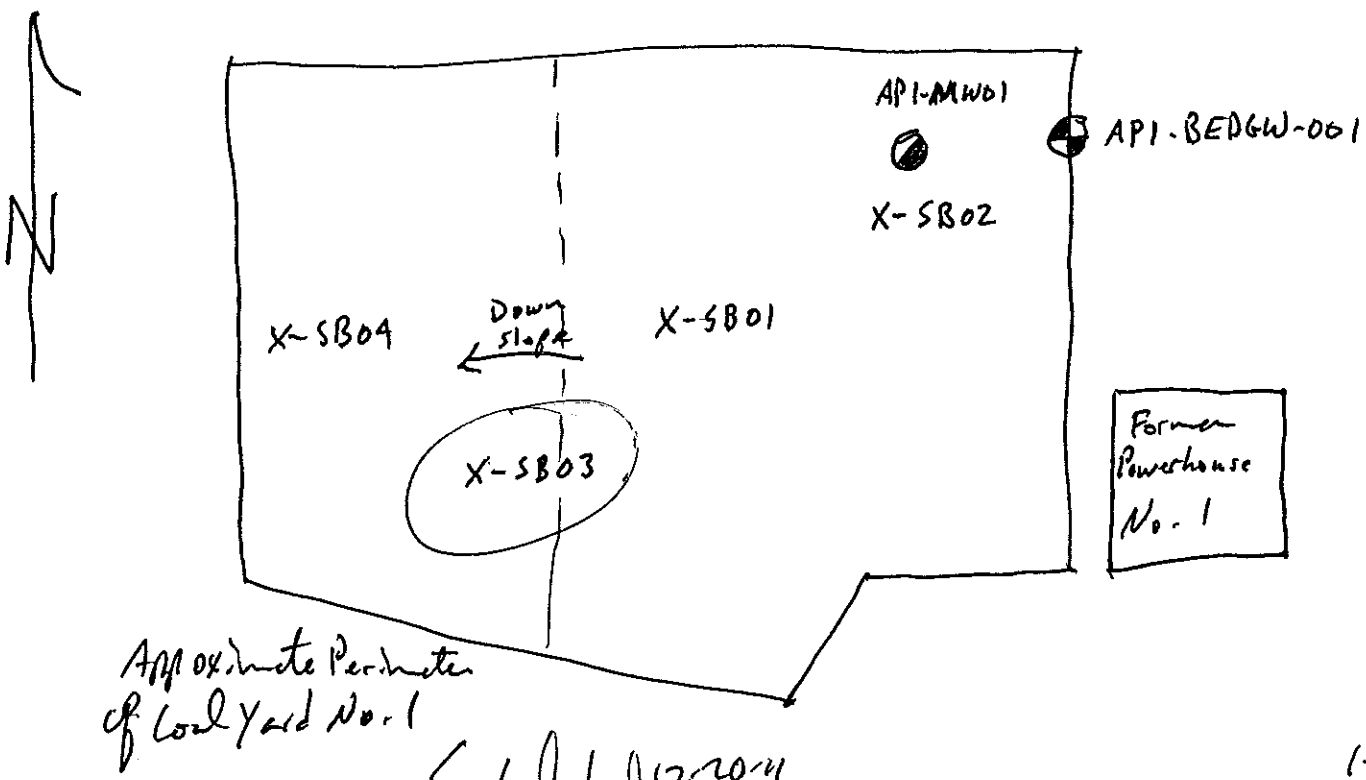
ERPIMS Values:

Sacode:

Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E.W. Weaver 12-20-11 *Reviewed BY / Date:* Edward Sanborn 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0012
Sample Name: PB11-SS-CY1-SB04-CY0012-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1242
Start Depth: 1.0'
End Depth: 2.0'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

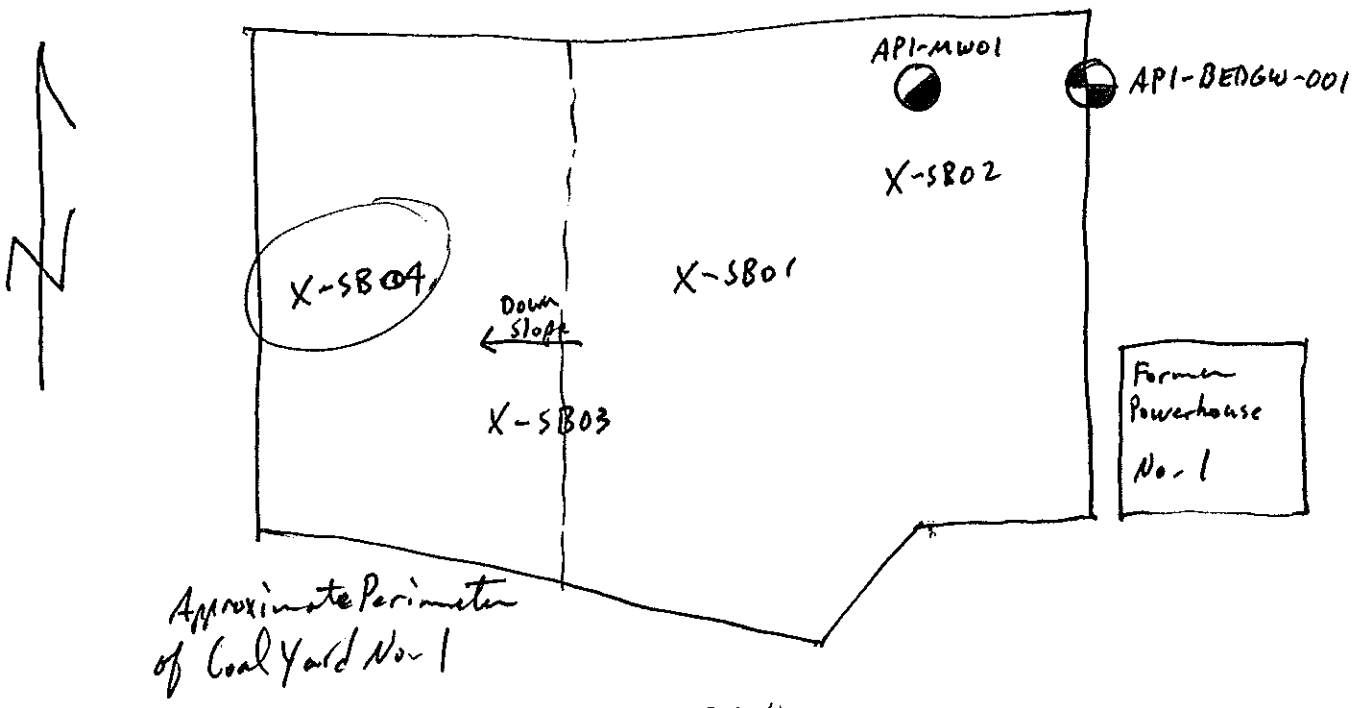
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: ~~Also collected MS (CY0013MS) and MSD (CY0013MSD) at this location.~~ EW

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: **CY1-SB04**
Sample Number: **CY0013**
Sample Name: **PB11-DS-CY1-SB04-CY0013-(3-5)-REG**
Sampling Method: **SS**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Stainless Steel Bucket Auger

Task: **GMA_OCT2011**
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

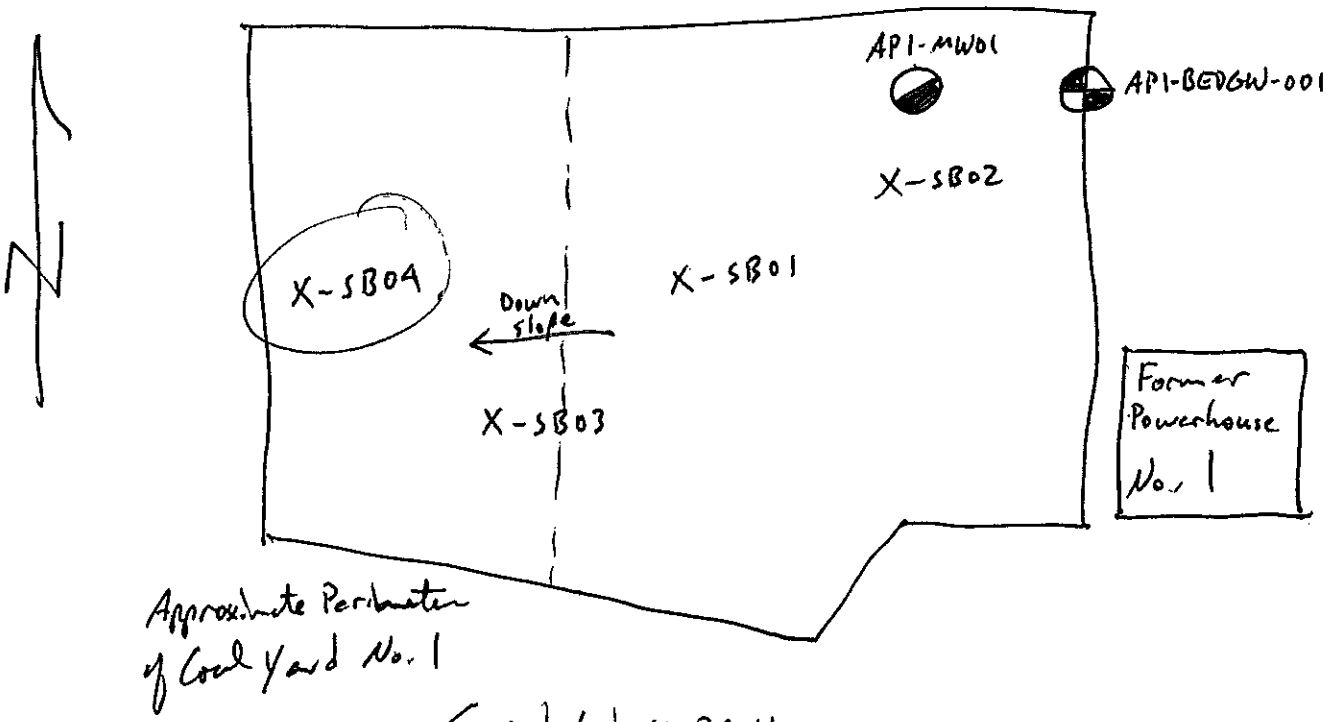
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected MS (CY0013MS) and MSD (CY0013MSD) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS
Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0013MS
Sample Name: PB11-DS-CY1-SB04-CY0013MS-(3-5)-MS
Sampling Method: SS
Sample Type: DS *Sample Purpose:* MS
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

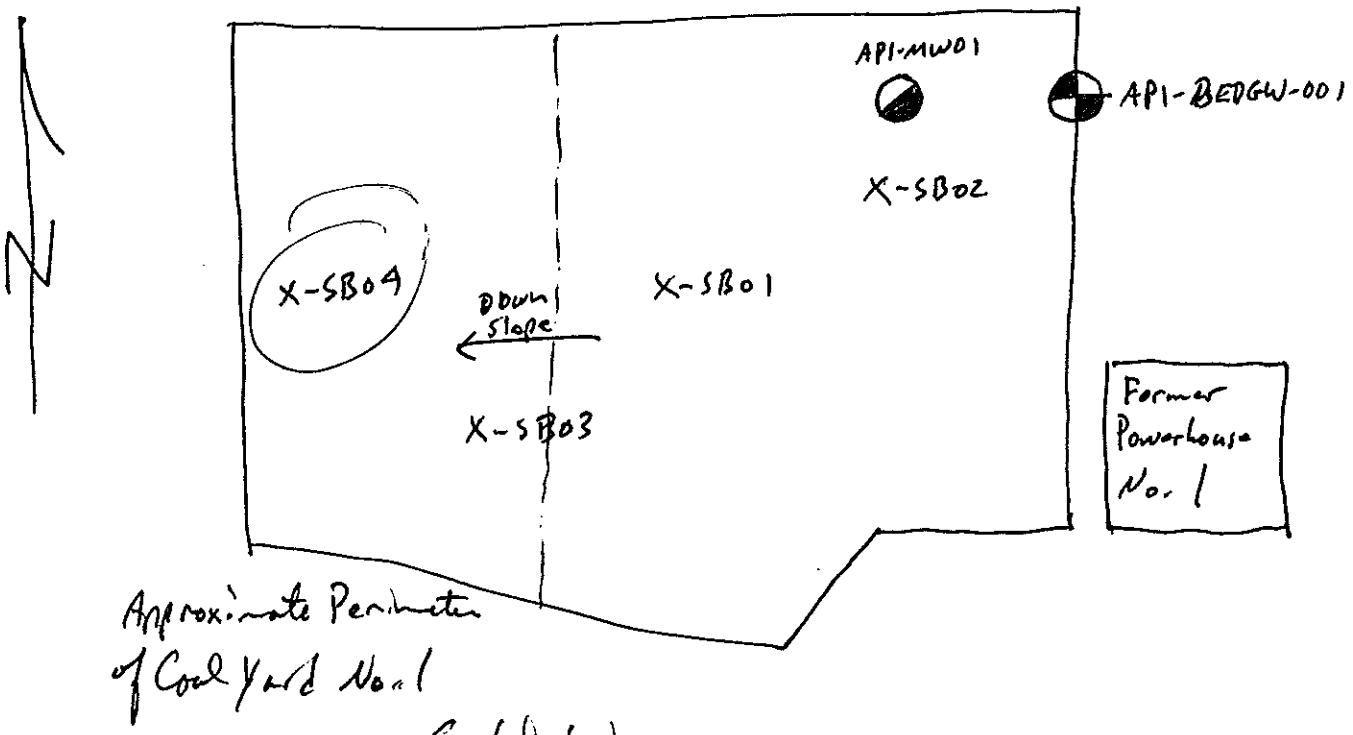
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0013) and MSD (CY0013MSD) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver *Reviewed BY / Date:* [signature] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0013MSD
Sample Name: PB11-DS-CY1-SB04-CY0013MSD-(3-5)-MSD
Sampling Method: SS
Sample Type: DS *Sample Purpose:* MSD
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

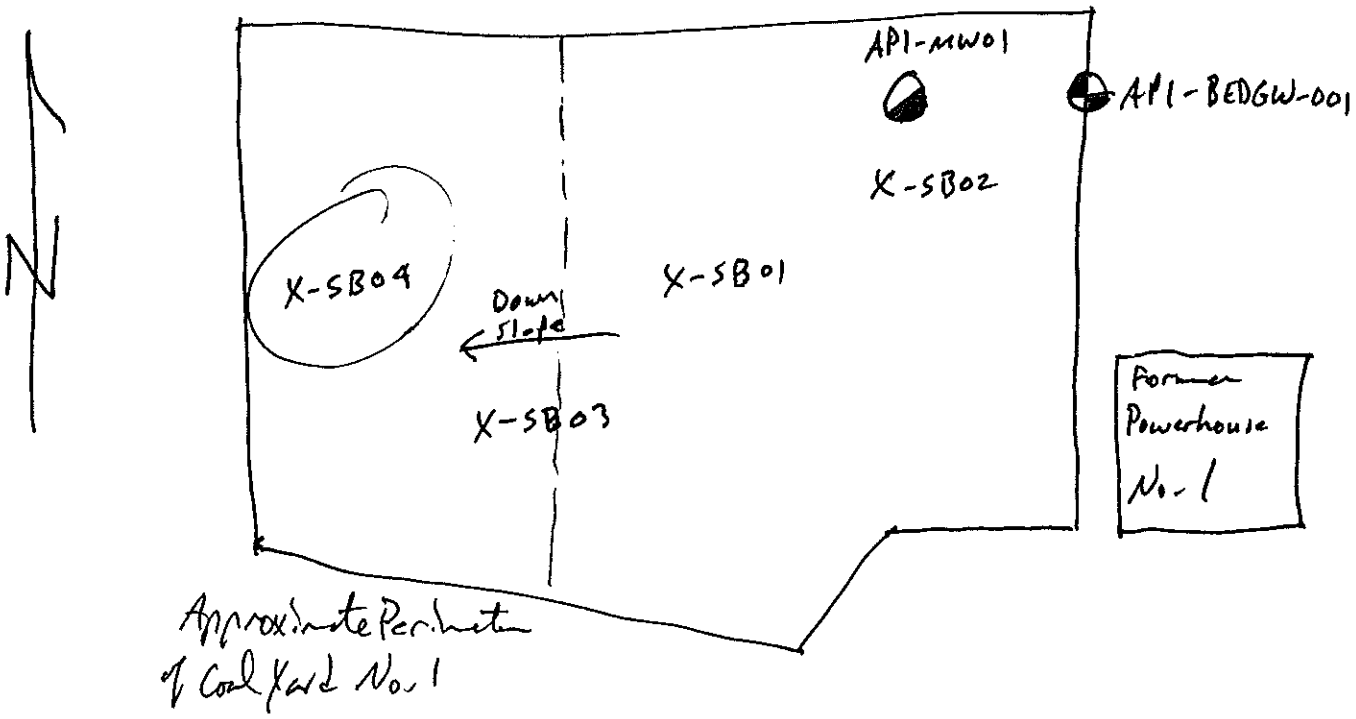
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0013) and MS (CY0013MS) at this location.

Sketch Location:



Logged BY / Date: E.W. Weaver 12-20-11 *Reviewed BY / Date:* Edward E. Weaver 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0014
Sample Name: PB11-DS-CY1-SB04-CY0014-(8-10)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1340
Start Depth: 8'
End Depth: 10'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

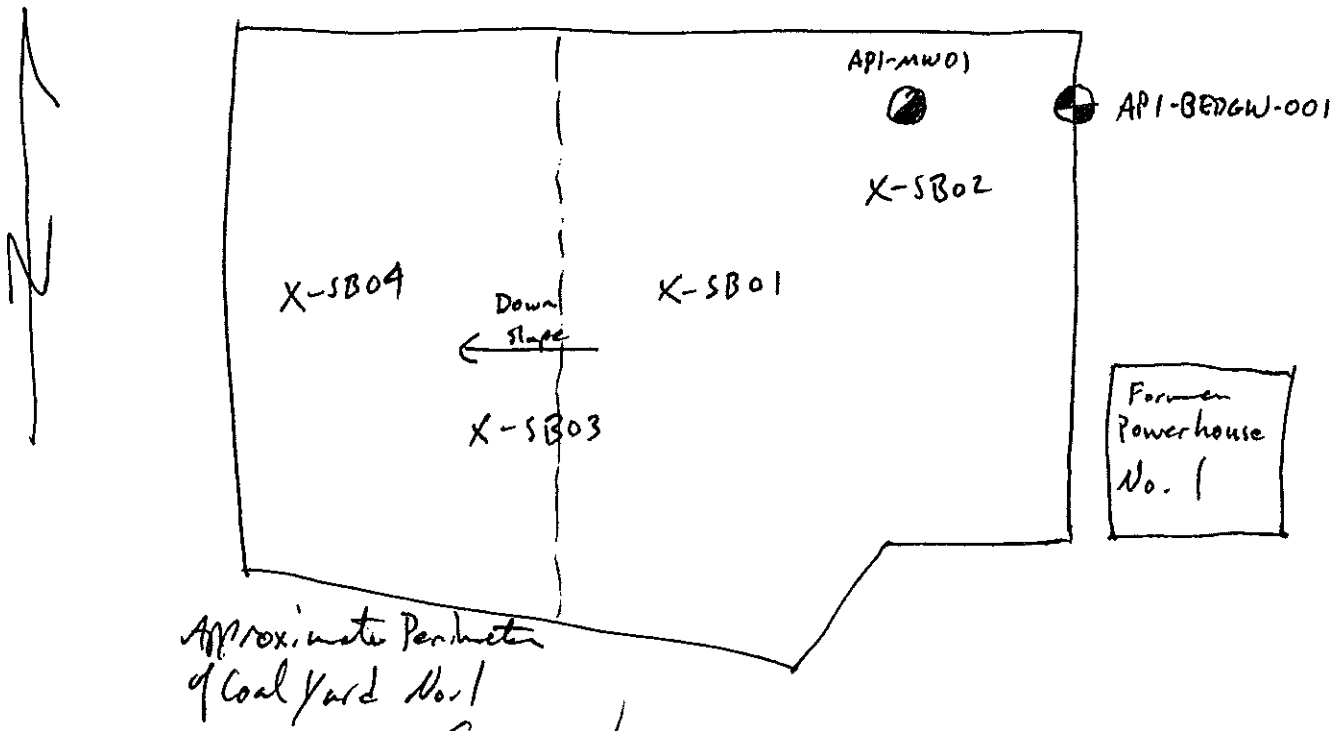
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E W Weaver

Reviewed BY / Date: Edward E Weaver 1-23-12

APPENDIX B

SOIL BORING HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE DRILL LOGS

HTRW DRILLING LOG

DISTRICT	Nashville
HOLE NUMBER	CY1-SB01
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	640.31 N-623312.31 E-1918693.70
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
15. DEPTH GROUNDWATER ENCOUNTERED	0.5'
13. DEPTH DRILLED INTO ROCK	0
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	10'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

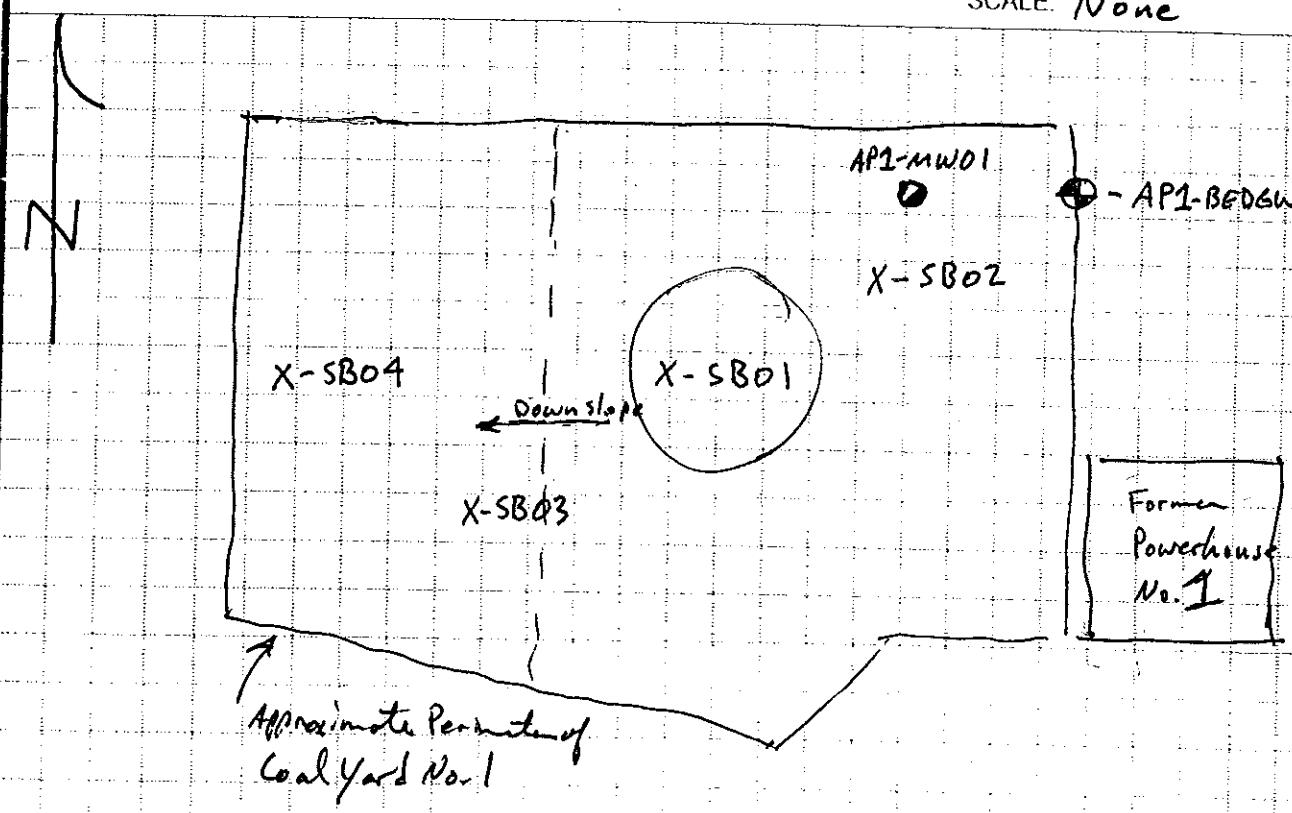
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	PCB's	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	E. W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB01

DAC

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB01

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) silt with sand, coal, moist, soft. 0.5'	ML		Time			
	1	Dark yellowish brown (10YR 4/6) fine grain sand with silt, wet, loose. 3'	SM		1100	0.5'-1.5' CY0001		
	3	Gray (10YR 5/1) silt with clay, wet, soft. 6'	ML		1115	3.0'-5.0' CY0002		
	6	Gray (10YR 5/1) clay with sand, moist, stiff.	CL		1145	8.0'-10.0' CY0003		
	10	Total Depth = 10 Ft						

Project: PBOW

Hole Number: CY1-SB01

HTRW DRILLING LOG

DKR

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville
HOLE NUMBER	CY1-SB02
2. DRILL SUBCONTRACTOR	NA
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	640.42 N-623317.59 E-1918784.80
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
15. DEPTH GROUNDWATER ENCOUNTERED	1.5'
13. DEPTH DRILLED INTO ROCK	0
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	10'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

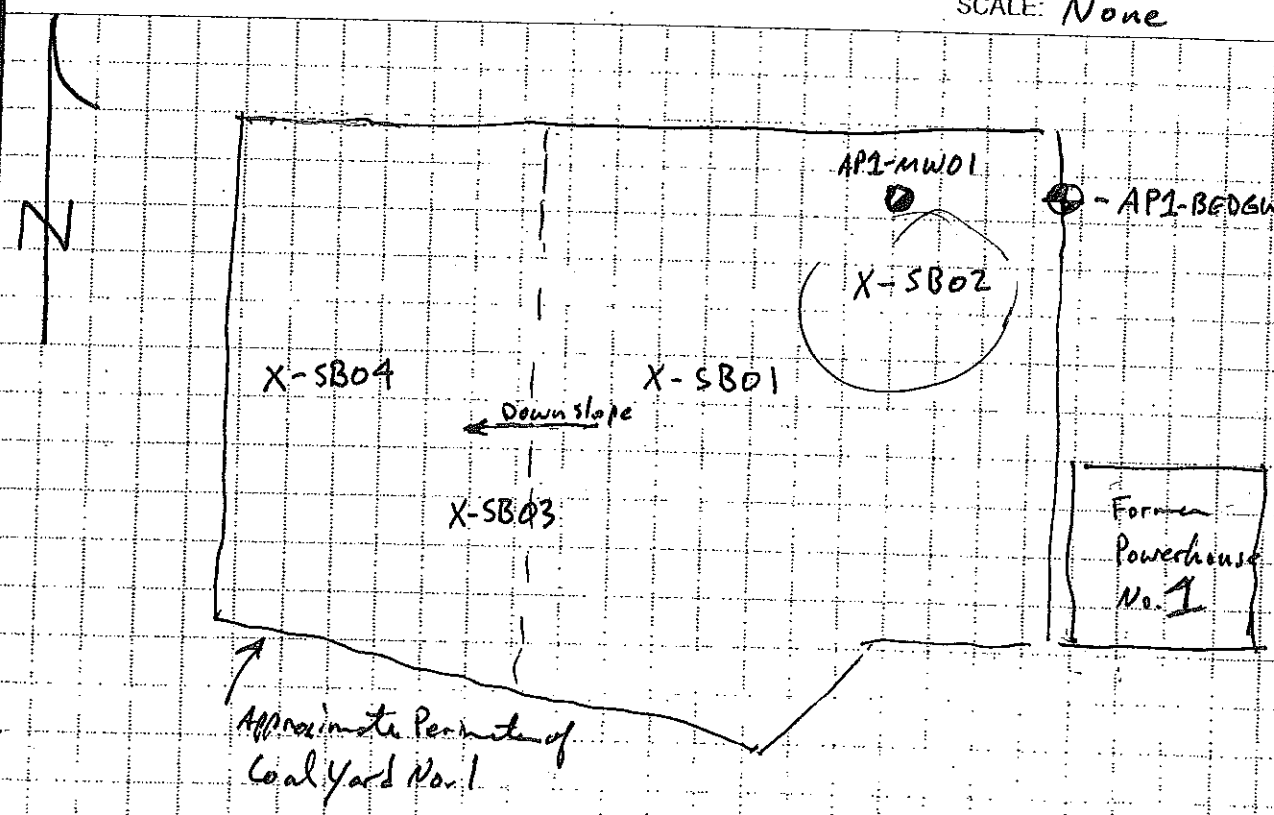
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	PCB's	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB02

DKR

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CYI-SB02

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Very dark gray (10YR 3/1) silt with sand, coal, moist, soft 0.3'	ML		Time			
		Yellowish brown (10YR 5/6) very fine grain sand with silt, moist, loose.	SM		1000	0.3'-1.3' CY0004		
	1	—wet						
	2							
	3					3.0'-5.0' CY0005		
	4	4'			1015			
		Black (10YR 2/1) silt with clay, sand, cinders, wet, soft.	ML					
	5							
	6	6'						
		Olive brown (2.5Y 4/3) silt with sand, clay, moist, stiff.						
	7							
	8	8'						
		Dark yellowish brown (10YR 4/6) clay with silt, moist, stiff.	CL			8.0'-10.0' CY0006		
	9				1042			
	10	Total Depth = 10 ft						

Project: PBOW

Hole Number: CYI-SB02

DAK

HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
DISTRICT	Nashville
HOLE NUMBER	CYI-SB03
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	636.99 N-623280.45 E-1918640.43
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
13. DEPTH DRILLED INTO ROCK	0
14. TOTAL DEPTH OF HOLE	10'
15. DEPTH GROUNDWATER ENCOUNTERED	None
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

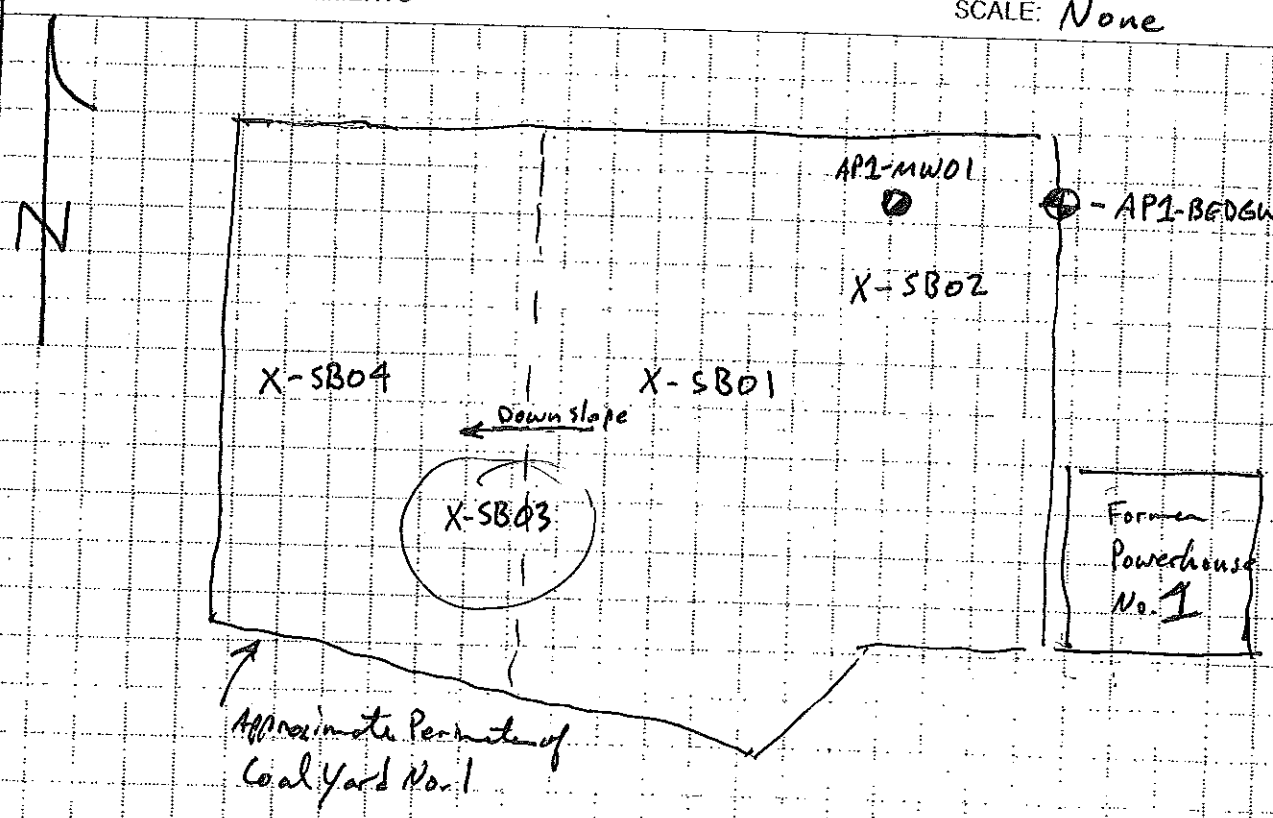
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	~~PCB's~~	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CYI-SB03

DKK

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB03

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) silt with clay, coal moist, soft. 0.5'	ML		Time			
		Very dark gray (10YR 3/1) silt with clay, sand, moist, medium stiff. 3'			1155	0.5'-1.5'		
		Gray (10YR 6/1) clay with sand, moist, stiff. 5'	CL		1205	3.0'-5.0'		
		Dark gray (10YR 4/1) clay with sand, moist, stiff.			1225	8.0-10.0'		
	10	Total Depth - 10 ft						

Project: PBOW

Hole Number: CY1-SB03

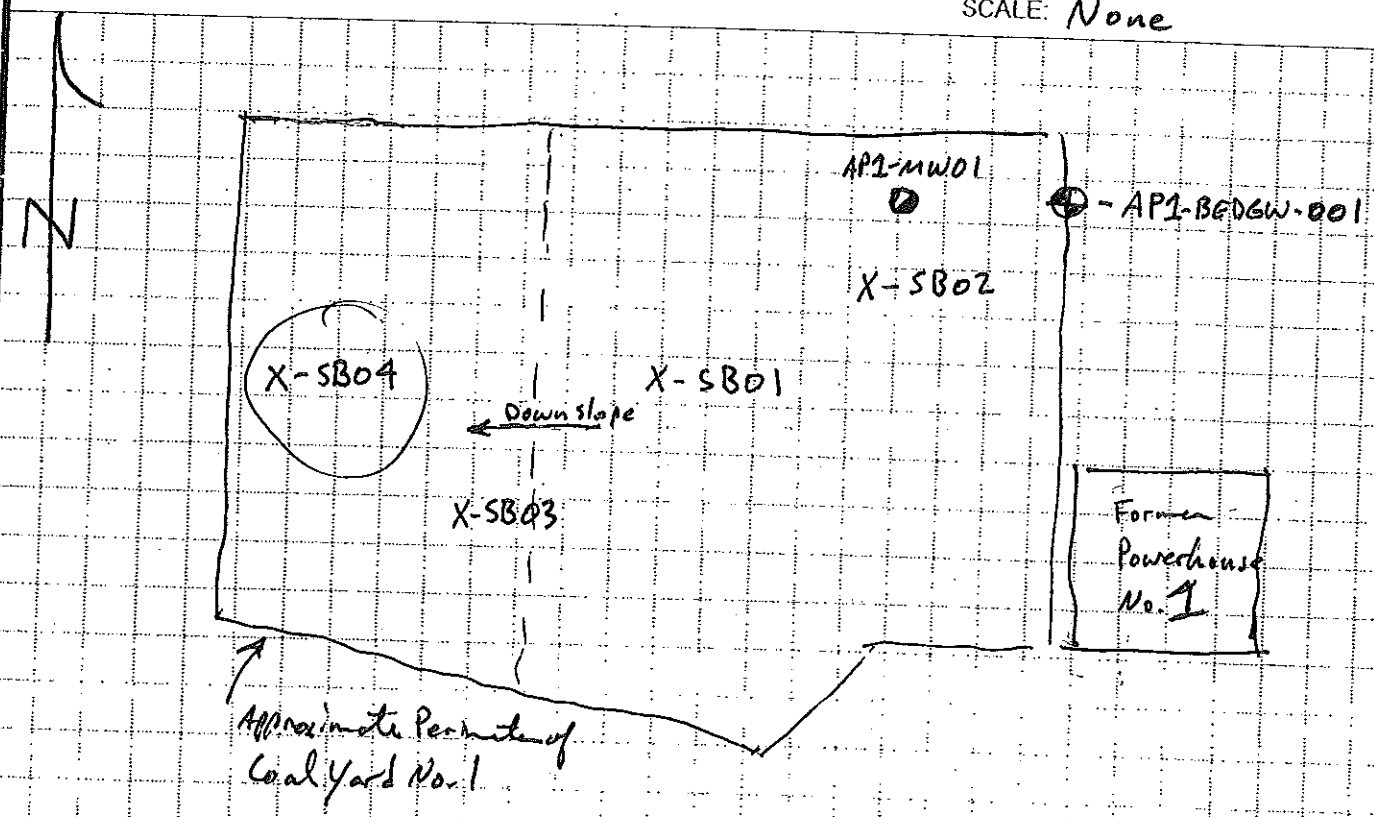
DEE

HTRW DRILLING LOG

DISTRICT	Nashville
HOLE NUMBER	CY1-SB04
SHEET / SHEETS	1 of 2
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger; 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	636.46 N-623344.70 E-1918544.11
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
13. DEPTH DRILLED INTO ROCK	0
14. TOTAL DEPTH OF HOLE	10
15. DEPTH GROUNDWATER ENCOUNTERED	None
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	—
DISTURBED	—
UNDISTURBED	—
19. TOTAL NUMBER OF CORE BOXES	—
20. SAMPLES FOR CHEMICAL ANALYSIS	✓
VOC	—
METALS	✓
OTHER (SPECIFY)	Explosives
OTHER (SPECIFY)	SVOC's
OTHER (SPECIFY)	PCB's
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE	
BACKFILLED	✓
MONITORING WELL	—
OTHER (SPECIFY)	—
23. SIGNATURE OF INSPECTOR	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB04

DKL

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB04

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) Silt with clay, coal, sand, moist, soft.	ML		Time			
	1					1.0'-2.0' CY0012		
		1.5'						
		Dark yellowish brown (10YR 4/6) fine grain sand with silt, moist, loose.	SM		1242			
	2							
	3	3'						
		Gray (10YR 6/1) clay with sand, moist, moist, stiff.	CL			3.0'-5.0' CY0013 CY0013MS CY0013MSD		
	4				1250			
	5	5'						
		Dark gray (10YR 4/1) clay with sand, moist, stiff.						
	6							
	7							
	8					8.0-10.0 CY0014		
	9				1340			
	10	Total Depth = 10 ft						

Project: PBOW | Hole Number: CY1-SB04

DKK

APPENDIX C

LAND SURVEY DATA

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I
MAY - NOVEMBER, 2011

SUMMARY OF WORK PERFORMED

Between May, 2011 and November, 2011, Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., surveyed a total of 255 environmental sampling locations (soil samples, soil bores, test pits, sediment samples, piezometers, and monitoring wells) throughout the Plumbrook Ordnance Works facility. Surveying was performed over the course of three separate mobilizations, described more particularly as follows:

1st Mobilization (23-27 May, 2011) - 44 survey points: Unloading Area (12 points); Sellite Area (11 points); Wastewater Treatment Plant #2 site (10 points); and TNT C Sewer Line (11 points).
2ND Mobilization (26-30 September, 2011) – 176 survey points: Wastewater Treatment Plant #2 site (4 points); TNT C Sewer Line (3 points); Steel Sewer Line (40 points); Sellite Area (23 points); Unloading Area (3 points); TNT A Sewer Line (24 points); Ash Pit #3 (3 points); and Acid Area #1 (76 points).
3RD Mobilization (7-10 November, 2011) – 35 survey points: Acid Area #1 (12 points); Sellite Area (11 points); Coal Yard #1 (4 points); Coal yard 32 (4 points); and Coal Yard #3 (4 points)

Work was performed in accordance with Shaw E & I surveying specifications under purchase orders #680616-000 OP, 680686-000 OP, 680702-000 OP, and 680711-000 OP.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Paul Lewis – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All sampling locations reported below were surveyed with a Topcon GTS-235 Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. Survey control used meets or exceeds the standards for a Third Order, Class II horizontal and Third Order vertical survey as defined in the Standards and Specifications for Geodetic Control Networks (1984). The survey control points used in this operation were established by this firm, presently or previously (January, 2009), by direct static differential GPS observation using three Ashtech Promark II GPS receivers with reference to NGS Monument

"Sky D" as a fixed horizontal reference and NGS Monument "J-318" (a first order benchmark) as a fixed vertical reference. The horizontal datum is NAD 83(1995). The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.999927034.

SKY D:	J-318:
Northing (y) 196,085.494 m	Northing (y) 196,170 m +/-
Easting (x) 586,761.658 m	Easting (x) 583,400 m +/-
Orthometric Elevation 175.30 m +/-	Orthometric Elevation 182.801 m
(SKYD not used as vertical control)	(First Order Class II NGVD 29 Benchmark)

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

12/29/2011

Date

SAMPLE LOCATIONS:

Sellite Area (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
176	623869.42	1916750.44	637.70	636.3	PZ-01/SB-01
190	624014.07	1916719.34	635.50	633.5	PZ-02/SB-02
188	624020.14	1916786.02	635.51	632.9	PZ-03/SB-08
178	623929.48	1916752.25	639.51	636.6	PZ-04/SB-11
184	623934.02	1916892.19	634.43	633.7	PZ-05/SB-12
182	623872.51	1916884.23	634.37	633.8	PZ-06/SB-14
186	623895.85	1916986.31	634.44	632.9	PZ-07
193	623956.38	1916636.65	637.76	634.9	PZ-08
174	623798.08	1916683.07	636.59		SB-06
173	623786.75	1916777.79	636.27		SB-07
194	623888.92	1916843.75	636.95		SB-13

Sellite Area (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1351	623784.44	1916774.54	639.23	636.3	FSB MW-01
1339	623876.91	1916738.07	638.99	635.9	FSB MW-02
1335	624104.10	1916731.84	637.31	634.5	FSB MW-03
1341	624087.55	1916684.17	634.67		FSBSB-15
1347	623629.46	1917087.66	633.09		FSBSD-01
1346	623776.17	1917073.42	631.57		FSBSD-02
1365	623907.05	1917011.31	630.62		FSBSD-03
1364	624003.39	1916967.91	630.28		FSBSD-04
1362	624042.36	1916741.69	632.46		FSBSD-05
1363	623994.37	1916632.10	630.44		FSBSD-06
1357	623902.10	1916716.24	636.31		FSBSS-01
1359	623901.30	1916753.54	636.35		FSBSS-02
1358	623885.21	1916694.10	636.85		FSBSS-03
1360	623890.92	1916784.72	636.34		FSBSS-04
1356	623857.12	1916694.62	636.61		FSBSS-05
1361	623859.54	1916784.34	636.24		FSBSS-06
1355	623830.07	1916703.62	636.60		FSBSS-07
1354	623807.59	1916713.95	636.40		FSBSS-08
1353	623801.60	1916743.43	636.21		FSBSS-09
1352	623808.70	1916775.45	636.09		FSBSS-10
1445	623865.15	1916885.40	633.95		FSBTOC-01
1446	623932.91	1916885.13	633.99		FSBTOC-02
1447	624015.89	1916713.76	633.89		FSBTOC-03

Sellite Area (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1573	623883.26	1916668.05	637.11		SELSS-14
1575	623923.25	1916681.43	636.44		SELSS-15
1576	623943.21	1916722.42	636.04		SELSS-16
1577	623921.93	1916798.71	636.90		SELSS-17
1567	623853.57	1916821.88	636.27		SELSS-18
1568	623810.03	1916811.69	636.44		SELSS-19
1569	623759.95	1916739.76	636.59		SELSS-20
1566	623813.26	1916892.50	634.84		SELSS-21
1570	623813.21	1916632.33	637.07		SELSS-22
1571	623834.86	1916668.04	637.22		SELSS-23
1572	623890.63	1916627.56	636.31		SELSS-24

Unloading Area (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
165	623921.17	1917391.09	637.81	634.9	PZ-01/SB-01
163	623922.42	1917456.71	639.09	635.6	PZ-02/SB-04
151	623746.08	1917524.35	639.19	637.5	PZ-03/SB-11
154	623845.17	1917437.12	636.83	636.0	PZ-04/SB-02
161	623948.26	1917535.43	639.75	636.9	PZ-05
171	623948.78	1917093.30	634.92	633.9	PZ-06
169	623972.05	1917234.56	636.91	634.1	PZ-07
156	623752.04	1917199.54	633.98	633.3	PZ-08
166	623930.55	1917322.87	633.71		SB-06
167	623924.05	1917228.33	634.30		SB-07
170	623913.67	1917151.13	633.88		SB-09
152	623770.64	1917492.33	637.19		SB-12

Unloading Area (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1345	623759.93	1917202.98	636.19	633.2	ULA MW-01
1326	623917.73	1917163.13	636.97	633.9	ULA MW-02
1330	624017.95	1917082.01	636.80	633.7	ULA MW-03

Wastewater Treatment Plant #2 (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
554	623195.57	1911020.62	632.24	631.0	PZ-01
540	623108.02	1910684.85	641.47	638.4	PZ-02/SB-02
537	623144.69	1910827.50	640.32	637.8	PZ-03/SB-03
544	623058.08	1910992.40	633.38	631.7	PZ-04
549	623080.30	1910781.11	640.60	637.9	PZ-05/SB-05
564	622607.16	1910804.90	634.71	631.6	PZ-06/SB-06
541	623187.47	1910808.30	637.72		SB-01
538	623097.30	1910811.38	638.67		SB-04
542	623033.63	1910866.71	633.10		SB-07
550	622983.08	1910735.71	637.95		SB-08

Wastewater Treatment Plant #2 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1429	623207.36	1910619.96	644.37	641.7	WWTP2 MW-01
1433	623085.26	1910791.36	640.39	637.8	WWTP2 MW-02
1437	623147.10	1910834.46	640.06	637.5	WWTP2 MW-03
1441	623044.98	1910991.57	635.02	631.9	WWTP2 MW-04

TNT Area C Sewer Line (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
552	622788.18	1910747.40	637.23	634.8	PZ-01/SB-01
556	622453.95	1910931.11	634.16	631.7	PZ-02/SB-02
558	622398.23	1910961.31	633.76	631.2	PZ-03/SB-03
560	622308.19	1910977.84	632.98	631.0	PZ-04/SB-04
562	622256.01	1911033.31	637.05	634.5	PZ-05/SB-05
570	621987.34	1911159.29	642.27	640.6	PZ-06/SB-06
572	621977.78	1911141.29	642.43	640.5	PZ-07/SB-07
566	621963.90	1911117.11	643.00	641.1	PZ-08/SB-08
574	621870.49	1911217.73	642.81	641.4	PZ-09/SB-09
576	621787.53	1911234.38	643.08	641.1	PZ-10/SB-10
578	621653.06	1911296.36	643.26	641.0	PZ-11/SB-11

TNT Area C Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1419	622408.93	1910955.79	634.01	631.4	TNTCSL MW-01
1414	621962.33	1911149.14	643.24	640.4	TNTCSL MW-02
1410	621457.27	1911382.57	645.19	642.6	TNTCSL MW-03

Steel Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1314	624207.78	1918010.06	635.11	631.7	SSL MW-01
1715	622883.53	1915564.71	638.96	635.9	SSL MW-02
1403	622637.39	1912719.90	640.63	637.7	SSL MW-03
1303	623886.12	1919381.30	636.39		SSL-TP1
1302	624009.95	1919173.97	638.01		SSL-TP2
1301	624073.83	1919068.79	636.98		SSL-TP3
1309	624152.86	1918928.22	633.47		SSL-TP4
1308	624153.15	1918615.50	633.86		SSL-TP5
1307	624159.13	1918372.96	632.97		SSL-TP6
1310	624163.81	1918020.97	632.14		SSL-TP7
1318	624175.91	1917084.86	632.51		SSL-TP8
1319	624177.58	1916916.80	633.52		SSL-TP9
1368	623956.34	1916571.69	634.21		SSL-TP11
1371	623585.64	1916234.80	632.54		SSL-TP12
1716	622874.51	1915562.57	636.12		SSL-TP13
1719	622755.28	1915453.34	638.07		SSL-TP14
1722	622571.26	1915283.29	639.46		SSL-TP15
1723	622574.78	1915168.09	637.75		SSL-TP16
1394	622605.96	1913620.05	640.77		SSL-TP17
1404	622623.59	1912721.64	637.37		SSL-TP18
1405	622632.23	1912646.98	637.76		SSL-TP19
1406	622629.17	1912619.75	638.07		SSL-TP20
1422	622610.61	1911714.53	639.71		SSL-TP21
1421	622652.39	1911593.26	639.63		SSL-TP22
1420	622656.36	1911533.51	640.26		SSL-TP23
1423	622655.95	1911264.17	630.28		SSL-TP24
1424	622657.42	1911187.19	631.10		SSL-TP25
1425	622658.15	1911118.09	631.57		SSL-TP26
1444	622674.01	1910717.04	634.20		SSL-TP27
1443	622674.85	1910643.89	634.22		SSL-TP28
1442	622861.59	1910645.64	642.45		SSL-TP30
1300	623927.48	1919565.67	638.27		SSLUTL-01
1369	623778.12	1916411.67	636.87		SSLUTL-02
1370	623694.24	1916334.79	635.88		SSLUTL-03
1706	623047.03	1915726.29	634.04		SSLUTL-04
1707	622976.47	1915659.23	633.97		SSLUTL-05
1709	623104.14	1915779.14	638.54	636.2	SSL-PZ02
1710	622891.58	1915551.55	638.84	635.8	SSL-PZ03
1718	622800.09	1915490.11	640.81	638.3	SSL-PZ04
1721	622733.22	1915418.55	640.92	638.9	SSL-PZ05

TNT Area A Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1457	624602.74	1921705.79	628.82		SLSB-02
1471	624326.70	1922541.92	630.17		SLSB-05
1472	624321.95	1922542.98	630.72		SLSB-11
1473	624328.53	1922551.60	630.25		SLSB-12
1474	624331.64	1922540.29	630.69		SLSB-13
1475	624325.12	1922532.16	630.64		SLSB-14
1452	624603.71	1921686.40	628.85		SLSB-15
1453	624608.61	1921697.12	628.87		SLSB-16
1454	624600.16	1921695.20	628.85		SLSB-17
1455	624608.15	1921706.14	628.70		SLSB-18
1456	624598.59	1921705.76	629.12		SLSB-19
1458	624605.09	1921717.51	628.79		SLSB-20
1459	624595.56	1921714.41	628.80		SLSB-21
1460	624600.20	1921724.09	628.47		SLSB-22
1461	624321.46	1922512.67	630.73		SLSB-23
1462	624333.58	1922551.28	630.73		SLSB-24
1463	624323.74	1922552.17	630.74		SLSB-25
1464	624336.76	1922570.87	630.79		SLSB-26
1465	624331.95	1922571.35	630.29		SLSB-27
1466	624327.14	1922571.94	630.66		SLSB-28
1467	624340.09	1922589.79	630.68		SLSB-29
1468	624335.01	1922590.95	630.37		SLSB-30
1469	624330.01	1922591.43	630.57		SLSB-31
1470	624338.73	1922610.57	630.27		SLSB-32

Ash Pit #3 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1382	622910.53	1914684.10	638.03	638.5	AP3 MW-01
1379	622958.84	1914572.39	640.24	637.3	AP3 MW-02
1388	623077.56	1914421.69	639.28	636.2	AP3 MW-03

Acid Area #1 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29) Adjacent Ground Elev.	Shaw Designation
1503	623078.28	1917106.10	638.42	AA1SS-01
1502	623076.73	1917171.83	638.44	AA1SS-02
1501	623075.70	1917246.79	638.55	AA1SS-03
1500	623039.17	1917293.39	638.66	AA1SS-04
1499	622984.40	1917293.03	638.45	AA1SS-05
1512	622954.08	1917229.01	639.05	AA1SS-06
1511	622955.77	1917164.58	639.23	AA1SS-07
1508	622956.83	1917089.10	639.38	AA1SS-08
1510	623001.76	1917066.77	638.34	AA1SS-09
1515	622887.69	1917172.92	639.32	AA1SS-10
1516	622907.05	1917233.67	639.03	AA1SS-11
1517	622881.62	1917304.26	637.83	AA1SS-12
1518	622814.45	1917329.70	638.00	AA1SS-13
1520	622707.29	1917340.43	638.81	AA1SS-14
1521	622704.30	1917231.64	639.59	AA1SS-15
1496	622975.86	1917587.10	638.45	AA1SS-16
1495	623037.08	1917589.53	637.75	AA1SS-17
1480	623064.78	1917704.91	639.12	AA1SS-18
1479	623065.08	1917637.67	638.31	AA1SS-19
1481	623061.83	1917804.59	638.68	AA1SS-20
1484	623034.78	1917834.69	638.79	AA1SS-21
1485	622967.39	1917835.92	638.45	AA1SS-22
1491	622930.15	1917771.74	639.63	AA1SS-23
1492	622932.71	1917708.65	639.61	AA1SS-24
1493	622932.60	1917633.33	639.48	AA1SS-25
1604	622853.23	1917648.95	637.16	AA1SS-26
1528	622885.14	1917706.18	638.86	AA1SS-27
1531	622854.06	1917806.49	638.63	AA1SS-28
1539	622847.55	1917891.08	638.74	AA1SS-29
1540	622856.20	1917976.35	638.90	AA1SS-30
1541	622842.99	1918045.69	638.99	AA1SS-31
1563	622887.57	1918118.44	639.50	AA1SS-32
1564	622871.73	1918216.54	639.13	AA1SS-33
1553	622718.83	1918169.12	639.00	AA1SS-34
1551	622689.36	1918097.34	639.17	AA1SS-35
1538	622734.26	1917941.52	638.97	AA1SS-36
1536	622731.20	1917882.54	638.98	AA1SS-37
1532	622745.39	1917809.30	639.30	AA1SS-38
1533	622743.92	1917731.23	639.22	AA1SS-39
1534	622680.36	1917678.76	638.85	AA1SS-40
1530	622763.83	1917641.77	637.77	AA1SS-41
1556	622682.28	1918569.02	640.38	AA1SS-42

Acid Area #1 (September 2011) <cont.>

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29) Adjacent Ground Elev.	Shaw Designation
1559	622763.35	1918563.10	639.48	AA1SS-43
1560	622863.21	1918513.54	639.33	AA1SS-44
1561	622877.63	1918588.87	640.14	AA1SS-45
1562	622835.66	1918657.90	641.27	AA1SS-46
1554	622762.05	1918053.62	639.05	AA1SS-47
1519	622766.70	1917335.77	638.24	AA1SS-48
1509	622993.80	1917064.17	634.75	AA1SS-49
1498	623073.71	1917303.80	638.33	AA1SS-50
1513	622960.42	1917323.23	634.30	AA1SS-51
1524	622880.86	1917372.21	636.65	AA1SS-52
1525	622817.11	1917387.41	636.81	AA1SS-53
1523	622718.26	1917391.44	637.72	AA1SS-54
1522	622654.66	1917361.08	639.01	AA1SS-55
1497	623070.51	1917436.15	638.27	AA1SS-56
1514	622976.12	1917448.41	635.40	AA1SS-57
1527	622789.91	1917432.10	636.82	AA1SS-58
1526	622860.52	1917484.11	636.20	AA1SS-59
1478	623066.03	1917555.87	638.37	AA1SS-60
1494	622947.89	1917558.68	639.17	AA1SS-61
1529	622821.39	1917639.93	637.26	AA1SS-62
1482	623057.97	1917895.33	638.61	AA1SS-63
1486	623007.09	1917906.72	637.40	AA1SS-64
1487	622973.47	1917899.89	637.77	AA1SS-65
1490	622942.18	1917877.79	638.98	AA1SS-66
1535	622691.85	1917886.00	639.52	AA1SS-67
1483	623053.10	1917979.40	638.31	AA1SS-68
1488	623006.56	1917959.29	636.95	AA1SS-69
1489	622941.52	1917963.82	638.03	AA1SS-70
1537	622690.45	1917944.62	639.31	AA1SS-71
1552	622678.71	1918186.89	638.95	AA1SS-72
1565	622869.25	1918282.09	638.99	AA1SS-73
1555	622685.10	1918492.13	640.51	AA1SS-74
1557	622618.06	1918574.96	640.05	AA1SS-75
1558	622699.47	1918653.16	640.08	AA1SS-76

Acid Area #1 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1596	622702.09	1917439.32	637.52		AA1SS-77
1595	622650.07	1917422.19	638.74		AA1SS-78
1598	622648.39	1917885.23	639.34		AA1SS-79
1597	622650.25	1917964.73	638.95		AA1SS-80
1600	622745.55	1918688.23	639.71		AA1SS-81
1601	622692.32	1918741.84	640.68		AA1SS-82
1602	622639.59	1918661.45	640.79		AA1SS-83
1592	623121.40	1917266.85	639.48		AA1SS-84
1591	623133.18	1917184.05	639.34		AA1SS-85
1594	622575.71	1917360.29	637.60		AA1SS-86
1599	622560.41	1917915.86	637.94		AA1SS-87
1603	622637.03	1918781.36	640.23		AA1SS-88

Coal Yard #1 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1586	623312.31	1918693.70	640.31		COAL1-SB01
1587	623317.59	1918784.80	640.42		COAL1-SB02
1589	623280.45	1918610.43	636.99		COAL1-SB03
1590	623344.70	1918544.11	636.46		COAL1-SB04

Coal Yard #2 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1585	623081.60	1911875.80	637.87		COAL2-SB01
1584	623034.37	1911903.68	638.12		COAL2-SB02
1582	623066.83	1911941.56	638.10		COAL2-SB03
1583	623069.44	1911988.57	637.94		COAL2-SB04

Coal Yard #3 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1580	622941.18	1914858.88	639.33		COAL3-SB01
1578	622897.02	1914797.95	639.11		COAL3-SB02
1579	622921.16	1914832.59	639.18		COAL3-SB03
1581	622870.43	1914828.65	639.16		COAL3-SB04

APPENDIX D

INVESTIGATION-DERIVED WASTE MANIFEST

009108643JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: (800) 255-3924
4. Manifest Tracking Number: 009108643 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: (419) 621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: TRIAD TRANSPORT, INC.
U.S. EPA ID Number: OKD 981 588 791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC.
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. NON DOT HAZARDOUS, NON RCRA REGULATED	35	DM	1800	G	029L
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01. D098220DET / NON HAZARDOUS IDW WATER

NASA # N12002

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert Lallier on behalf of NASA GRC
Month 12 Day 26 Year 12

16. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Transporter signature (for exports only):
Port of entry/exit:
Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: MARK R. SMEALLIE
Signature: Mark R Smeallie
Month 1 Day 26 Year 12

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

18b. Alternate Facility (or Generator)
Manifest Reference Number:
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. LIW 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Julie Denzich
Signature:
Month 1 Day 10 Year 12

GENERATOR | INT'L | TRANSPORTER | DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

APPENDIX E

DATA VALIDATION SUMMARIES

Data Validation Summary Report
Coal Yard 1 Sampling December 2011
Former Plum Brook Ordnance Works
Sandusky, Ohio

1.0 Introduction

Level IV data validation was performed on 100 percent of the environmental soil samples collected for the December 2011 sampling events. The analytical data consisted of one sample delivery group (SDG) (F88938) analyzed by Accutest of Orlando, Florida. In addition, field split samples were collected and validated, one SDG (240-7168-1), was analyzed by Test America, and findings are discussed in Section 5.0 of this report.

The following samples were validated for this investigation:

SDG Number	Sample Number
F88938	CY0001, CY0002, CY0003, CY0004, CY0005, CY0006, CY0007, CY0008, CY0009, CY0011, CY0012, CY0013, CY0014
240-7168-1	CY0010

The chemical parameters for which the samples were analyzed are identified below:

Parameter (Prep/Analytical Method)
Semivolatile Organics by GC/MS SW846 3550C/8270D
Total and Dissolved Metals by SW846 3050B/6010C and 7471B
Nitroaromatic and Nitramine Explosives by SW846 8330A
PCBs by SW846 3550C/8082A
Wet Chemistry (TOC)

GC/MS - Gas chromatography/mass spectrometry. TOC - Total organic carbon.
PCB - Polychlorinated biphenyl.

2.0 Procedures

The sample data were validated following the logic identified in the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (January 2010) and the EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Review (June 2008) for all areas except blanks. EPA Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (April 1993) and Region 3 Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration (September 1994) were applied to the areas associated with blank contamination. Specific quality control (QC) criteria as identified in the quality assurance plan, analytical methods, and laboratory standard operating procedures were applied to all sample results. As a result of the use of Update III SW846 test methods for the analytical data and the application of the CLP guidelines during the validation process, there were instances where the specific QC requirements for all target compounds were not defined. This primarily occurred in the organic, GC/MS calibration areas and is due to the fact that the analytical methods are performance-based and allow the use of average calibration responses in lieu of individual responses, which are defined by CLP protocol. In light of

applying CLP guidelines to SW846 methods and evaluating the usability of the data during the validation process, specific QC criteria were determined to address all target compounds and are identified in this report for each parameter, as well as in the validation checklists, which function as worksheets. For those analytical methods not addressed by the CLP and Region 3 guidelines, the validation was based on the method requirements (i.e., SW846, Code of Federal Regulations, Standard Operating Procedures) and technical judgment, following the logic of the CLP validation guidelines. Laboratory-specific criteria may be found in Attachment A.

3.0 Summary of Data Validation Findings

The overall quality of the data was determined to be acceptable with minimal qualifications. An individual validation report has been prepared for the parameters analyzed, and the overall results of the validation findings are summarized in this report. A listing of the validation qualifiers and the reason codes, along with their definitions, is found in Attachment A. The following section highlights the key findings of the data validation process. No data were rejected.

4.0 Analysis-Specific Data Validation Summaries

4.1 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

Laboratory control sample (LCS) analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.2 Total and Dissolved Metals by SW846 6010B/7470A/7471
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met with the following exceptions:

SDG Number	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc	J/UJ

Laboratory Duplicate Sample Analysis
A laboratory duplicate sample analysis was performed for the project samples, and all QC criteria were met with the following exceptions:

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Barium	J

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Interference Check Sample
All interference check sample percent recoveries were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples with the following exceptions:

SDG	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Aluminum, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Vanadium, Zinc	J

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified with the following exceptions:

SDG	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0008 (original), CY0009 (Field Duplicate)	Manganese	J

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "B," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.3 Nitroaromatic and Nitroamine Explosives by SW846 8330
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent relative percent difference [RPD]) were met.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.4 Polychlorinated Biphenyls by SW846 8082
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits for all the project samples.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.5 Wet Chemistry (TOC)
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
All ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Duplicate Sample Analysis
A laboratory duplicate sample analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
No original and field duplicate samples were analyzed for the wet chemistry parameters.

Quantitation
Results quantified between the MDL and RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.0 Quality Assurance Field Split Sample Data Evaluation

Data from the quality assurance split sample, CY0010 (SDG 240-7168-1), were validated. The field split sample was analyzed for semivolatiles by SW846 8270C, explosives by SW846 8330, PCBs by SW846 8280, and total and dissolved metals by SW 846 6010B and 7471A. The following section highlights the key findings of the data validation for each analysis.

The following samples were validated for this site investigation:

SDG Number	Sample Number
240-7168-1	CY0010

Sample/Field Duplicate/Field Split
CY0008 (Original) / CY0009 (Field Duplicate) / CY0010 (Field Split)

5.1 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The ICAL and CCAL associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

LCS analysis was performed for the project samples, and all QC criteria were met.

Internal Standards

All internal standards met QC criteria.

Field Splits
Table 2 in Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.2 Total and Dissolved Metals by SW846 6010B/7470A/7471
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Interference Check Sample
All interference check sample percent recoveries were acceptable. All QC criteria were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples.

Field Splits
Table 2 of Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "B," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.3 Nitroaromatic and Nitroamine Explosives by SW846 8330

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The ICAL and CCAL associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits for the project samples.

Matrix Spike/Matrix Spike Duplicate

MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

LCS analysis was performed for the project samples, and all QC criteria were met.

Second Column Confirmation

Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Field Splits

Table 2 of Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation

Results quantitated between the MDL and the RL, which the laboratory qualified as “J,” were qualified as estimated (“J”) unless blank contamination was present or the results were rejected.

5.4 Polychlorinated Biphenyls by SW846 8082

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Field Splits
Table 2 in Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

ATTACHMENT A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B						
Acetone	59 - 134	59 - 134	14	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	83 - 124	83 - 124	11	78 - 118	78 - 118	N/A
Bromobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromodichloromethane	76 - 116	76 - 116	10	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromoform	68 - 128	68 - 128	11	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	87 - 115	87 - 115	9	76 - 117	76 - 117	N/A
Chloroethane	54 - 166	54 - 166	20	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	85 - 123	85 - 123	10	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
Carbon disulfide	67 - 147	67 - 147	12	N/A	N/A	N/A
Carbon tetrachloride	74 - 139	74 - 139	13	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	82 - 127	82 - 127	10	N/A	N/A	N/A
1,1-Dichloroethylene	75 - 133	75 - 133	13	62 - 130	62 - 130	N/A
1,1-Dichloropropene	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane	76 - 122	76 - 122	11	N/A	N/A	N/A
1,2-Dichloropropane	81 - 120	81 - 120	11	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane	74 - 116	74 - 116	11	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	81 - 114	81 - 114	10	N/A	N/A	N/A
cis-1,3-Dichloropropene	83 - 119	83 - 119	10	N/A	N/A	N/A
trans-1,2-Dichloroethylene	82 - 126	82 - 126	10	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 123	87 - 123	10	N/A	N/A	N/A
Ethylbenzene	87 - 118	87 - 118	10	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	N/A	N/A	N/A
2-Hexanone	58 - 125	58 - 125	14	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Methyl-2-pentanone	62 - 125	62 - 125	13	N/A	N/A	N/A
Methyl bromide	55 - 151	55 - 151	21	N/A	N/A	N/A
Methyl chloride	55 - 173	55 - 173	22	N/A	N/A	N/A
Methylene chloride	69 - 125	69 - 125	11	N/A	N/A	N/A
Methyl ethyl ketone	61 - 127	61 - 127	13	N/A	N/A	N/A
Methyl tert-Butyl Ether	N/A	N/A	N/A	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A
n- Propylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Styrene	78 - 118	78 - 118	11	N/A	N/A	N/A
1,1,1-Trichloroethane	79 - 133	79 - 133	11	N/A	N/A	N/A
1,1.1,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	71 - 120	71 - 120	11	N/A	N/A	N/A
1,1,2-Trichloroethane	80 - 114	80 - 114	11	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	80 - 131	80 - 131	12	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	86 - 116	86 - 116	10	70 - 119	70 - 119	N/A
Trichloroethylene	85 - 124	85 - 124	10	62 - 130	62 - 130	N/A
Trichlorofluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	57 - 153	57 - 153	22	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
Xylene (total)	86 - 120	86 - 120	10	N/A	N/A	N/A
Surrogates						
Dibromofluoromethane	87 - 116	87 - 116	N/A	85-115	85-115	N/A
1,2-Dichloroethane-D4	76 - 127	76 - 127	N/A	70-120	70-120	N/A
Toluene-D8	86 - 112	86 - 112	N/A	85-120	85-120	N/A
4-Bromofluorobenzene	84 - 120	84 - 120	N/A	75-120	75-120	N/A
Semivolatile Organic Compounds, SW-846 8270C						
Benzoic Acid	10 - 50	10 - 50	40	N/A	N/A	N/A
2-Chlorophenol	44 - 103	44 - 103	29	27 - 110	27 - 110	30
4-Chloro-3-methyl phenol	53 - 105	53 - 105	24	39 - 110	39 - 110	30
2,4-Dichlorophenol	53 - 108	53 - 108	26	N/A	N/A	N/A
2,4-Dimethylphenol	37 - 91	37 - 91	28	N/A	N/A	N/A
2,4-Dinitrophenol	37 - 111	37 - 111	30	N/A	N/A	N/A
4,6-Dinitro-o-cresol	62 - 115	62 - 115	26	N/A	N/A	N/A
2-Methylphenol	35 - 91	35 - 91	30	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A	N/A
3&4-Methylphenol	32 - 85	32 - 85	29	N/A	N/A	N/A
2-Nitrophenol	49 - 111	49 - 111	30	N/A	N/A	N/A
4-Nitrophenol	13 - 55	13 - 55	31	12 - 130	12 - 130	30
Pentachlorophenol	57 118	57 118	26	26 - 110	26 - 110	30
Phenol	13 - 54	13 - 54	34	14 - 112	14 - 112	30
2,4,5-Trichlorophenol	59 - 106	59 - 106	23	N/A	N/A	N/A
2,4,6-Trichlorophenol	58 - 107	58 - 107	24	N/A	N/A	N/A
Acenaphthene	58 - 106	58 - 106	21	40 - 110	40 - 110	30
Acenaphthylene	58 - 105	58 - 105	21	N/A	N/A	N/A
Anthracene	65 - 108	65 - 108	19	N/A	N/A	N/A
Benzo(a)anthracene	63 - 111	63 - 111	19	N/A	N/A	N/A
Benzo(a)pyrene	62 - 106	62 - 106	20	N/A	N/A	N/A
Benzo(b)fluoranthene	63 - 109	63 - 109	20	N/A	N/A	N/A
Benzo(g,h,i)perylene	61 - 111	61 - 111	21	N/A	N/A	N/A
Benzo(k)fluoranthene	64 - 111	64 - 111	20	N/A	N/A	N/A
4-Bromophenol phenyl ether	64 - 107	64 - 107	20	N/A	N/A	N/A
Butyl benzyl phthalate	59 - 114	59 - 114	20	N/A	N/A	N/A
Benzyl Alcohol	34 - 98	34 - 98	27	N/A	N/A	N/A
2-Chloronaphthalene	54 - 105	54 - 105	24	N/A	N/A	N/A
4-Chloroaniline	53 - 103	53 - 103	22	N/A	N/A	N/A
Carbazole	66 - 109	66 - 109	20	N/A	N/A	N/A
Chrysene	64 - 111	64 - 111	19	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	48 - 101	48 - 101	28	N/A	N/A	N/A
bis(2-Chloroethyl)ether	51 - 108	51 - 108	27	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	43 - 106	43 - 106	27	N/A	N/A	N/A
4-Chlorophenyl pheny ether	61 - 107	61 - 107	20	N/A	N/A	N/A
1,2-Dichlorobenzene	41 - 102	41 - 102	28	N/A	N/A	N/A
1,3-Dichlorobenzene	38 - 100	38 - 100	28	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,4-Dichlorobenzene	40 - 100	40 - 100	28	19 - 110	19 - 110	30
2,4-Dinitrotoluene	60 - 109	60 - 109	20	52 - 123	52 - 123	30
2,6-Dinitrotoluene	58 - 104	58 - 104	21	N/A	N/A	N/A
3,3'-Dichlorobenzidine	57 - 105	57 - 105	25	N/A	N/A	N/A
Dibenzo(a,h)antracene	62 - 112	62 - 112	20	N/A	N/A	N/A
Dibenzofuran	61 - 108	61 - 108	20	N/A	N/A	N/A
Di-n-butyl phthalate	62 - 109	62 - 109	20	N/A	N/A	N/A
Di-n-octyl phthalate	60 - 120	60 - 120	24	N/A	N/A	N/A
Diethyl phthalate	62 - 109	62 - 109	19	N/A	N/A	N/A
Dimethyl phthalate	63 - 106	63 - 106	19	N/A	N/A	N/A
Diphenylamine	N/A	N/A	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	59 - 116	59 - 116	21	N/A	N/A	N/A
Fluoranthene	65 - 114	65 - 114	21	N/A	N/A	N/A
Fluorene	61 - 106	61 - 106	19	N/A	N/A	N/A
Hexachlorobenzene	62 - 107	62 - 107	20	N/A	N/A	N/A
Hexachlorobutadiene	38 - 107	38 - 107	30	N/A	N/A	N/A
Hexachlorocyclopentadiene	19 - 84	19 - 84	35	N/A	N/A	N/A
Hexachloroethane	35 - 101	30 - 101	29	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	61 - 113	61 - 113	20	N/A	N/A	N/A
Isophorone	56 - 111	56 - 111	26	N/A	N/A	N/A
2-Metlhyl-4,6-dinitrophenol	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylnaphthalene	56 - 112	56 - 112	26	N/A	N/A	N/A
2-Nitroaniline	60 - 109	60 - 109	20	N/A	N/A	N/A
3-Nitroaniline	52 - 107	52 - 107	21	N/A	N/A	N/A
4-Nitroaniline	59 - 111	59 - 111	21	N/A	N/A	N/A
Naphthalene	50 - 104	50 - 104	28	N/A	N/A	N/A
Nitrobenzene	52 - 105	52 - 105	28	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	51 - 104	51 - 104	28	37 - 121	37 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine	57 - 110	57 - 110	19	N/A	N/A	N/A
Phenanthrene	65 - 108	65 - 108	20	N/A	N/A	N/A
Pyrene	60 - 113	60 - 113	20	55 - 120	55 - 120	30
1,2,4-Trichlorobenzene	45 - 104	45 - 104	28	25 - 110	25 - 110	30
Surrogates						
2-Fluorophenol	14 - 62	14 - 62	N/A	20-110	20-110	N/A
Phenol-d5	10 - 40	10 - 40	N/A	10-115	10-115	N/A
2,4,6-Tribromophenol	33 - 118	33 - 118	N/A	40-125	40-125	N/A
Nitrobenzene-d5	42 - 108	42 - 108	N/A	40-110	40-110	N/A
2-Fluorobiphenyl	40 - 106	40 - 106	N/A	50-110	50-110	N/A
Terphenyl-d14	39 - 121	39 - 121	N/A	50-135	50-135	N/A
Nitroaromatics and Nitroamines, SW-846 8330						
HMX	74 - 152	74 - 152	21	80 - 115	80 - 115	30
RDX	80 - 124	80 - 124	20	50 - 160	50 - 160	30
1,3-Dinitrobenzene	84 - 123	84 - 123	23	45 - 160	45 - 160	30
2,6-Dinitrotoluene	84 - 133	84 - 133	23	60 - 135	60 - 135	30
2,4-Dinitrotoluene	77 - 116	77 - 116	26	60 - 135	60 - 135	30
2-amino-4,6-Dinitrotoluene	78 - 117	78 - 117	28	55 - 155	55 - 155	30
4-amino-2,6-Dinitrotoluene	84 - 123	84 - 123	27	55 - 155	55 - 155	30
Nitrobenzene	76 - 128	76 - 128	28	50 - 140	50 - 140	30
o-Nitrotoluene	76 - 120	76 - 120	30	50 - 130	50 - 130	30
m-Nitrotoluene	74 - 124	74 - 124	32	45 - 135	45 - 135	30
p-Nitrotoluene	81 - 125	81 - 125	34	50 - 130	50 - 130	30
Tetryl	62 - 117	62 - 117	28	20 - 175	20 - 175	30
1,3,5-Trinitrobenzene	85 - 127	85 - 127	21	65 - 140	65 - 140	30
2,4,6-Trinitrotoluene	71 - 128	71 - 128	21	50 - 145	50 - 145	30
Nitroglycerin	N/A	N/A	N/A	76 - 116	76 - 116	30
PETN	N/A	N/A	N/A	69 - 117	69 - 117	30
Surrogate						

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
3,4-Dinitrotoluene	70 - 136	70 - 136	N/A	79-111	79-111	N/A
PCBs, SW-846 8082						
Aroclor-1016	76 - 117	76 - 117	16	44 - 119	10 - 199	30
Aroclor-1260	65 - 117	65 - 117	23	41 - 118	10 - 199	30
Surrogates						
Tetrachloro-m-xylene	38 - 127	38 - 127	N/A	27-130	27-130	N/A
Decachlorobiphenyl	25 - 137	25 - 137	N/A	10-127	10-127	N/A
Metals, SW-846 6010B/6020A/7470A						
Aluminum	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Water Quality						
Chloride	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Hardness as CaCO3	N/A	N/A	N/A	88 - 110	87 - 114	20
Nitrate	90 - 110	90 - 110	20	90 - 110	34 - 125	20
Sulfate	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Total Alkalinity	90 - 113	90 - 113	20	90 - 127	10 - 160	24
Total Cyanide	90 - 110	90 - 110	20	69 - 118	42 - 140	20
Total Dissolved Solids	N/A	N/A	5	88 - 110	N/A	20
Total Suspended Solids	N/A	N/A	5	73 - 113	N/A	20
Turbidity	N/A	N/A	8	75 - 125	N/A	20

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B						
Acetone	61 - 144	61 - 144	29	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	78 - 130	78 - 130	25	75 - 129	75 - 129	N/A
Bromobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromodichloromethane	73 - 122	73 - 122	25	N/A	N/A	N/A
Bromoform	70 - 139	70 - 139	26	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	83 - 122	83 - 122	23	75 - 127	75 - 127	N/A
Chloroethane	61 - 153	61 - 153	31	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	79 - 129	79 - 129	27	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
Carbon disulfide	61 - 142	61 - 142	27	N/A	N/A	N/A
Carbon tetrachloride	79 - 135	79 - 135	29	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	77 - 132	77 - 132	26	N/A	N/A	N/A
1,1-Dichloroethylene	66 - 132	66 - 132	27	55 - 142	55 - 142	N/A
1,2-Dichloroethane	78 - 129	78 - 129	24	N/A	N/A	N/A
1,2-Dichloropropane	74 - 127	74 - 127	27	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloropropene	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane	78 - 117	78 - 117	27	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	74 - 123	74 - 123	26	N/A	N/A	N/A
cis-1,3-Dichloropropene	79 - 130	79 - 130	23	N/A	N/A	N/A
trans-1,2-Dichloroethylene	77 - 129	77 - 129	27	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 131	87 - 131	27	N/A	N/A	N/A
Ethylbenzene	82 - 124	82 - 124	25	N/A	N/A	N/A
2-Hexanone	67 - 130	67 - 130	29	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Methyl-2-pentanone	69 - 125	69 - 125	24	N/A	N/A	N/A
Methyl bromide	60 - 146	60 - 146	31	N/A	N/A	N/A
Methyl chloride	58 - 163	58 - 163	26	N/A	N/A	N/A
Methylene chloride	62 - 140	62 - 140	25	N/A	N/A	N/A
Methyl ethyl ketone	66 - 134	66 - 134	23	N/A	N/A	N/A
Methyl tert-Butyl ether	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
n-Propylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Styrene	79 - 123	79 - 123	28	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1-Trichloroethane	80 - 133	80 - 133	27	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	70 - 128	70 - 128	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,1,2-Trichloroethane	76 - 118	76 - 118	28	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	79 - 132	79 - 132	27	N/A	N/A	N/A
Toluene	80 - 123	80 - 123	26	71 - 130	71 - 130	N/A
Trichloroethylene	78 - 132	78 - 132	28	70 - 131	70 - 131	N/A
Trichlorofluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	60 - 145	60 - 145	29	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
Xylene (total)	83 - 127	83 - 127	24	N/A	N/A	N/A
Surrogates						
Dibromofluoromethane	80 - 121	80 - 121	N/A	68-110	68-110	N/A
Toluene-D8	71 - 130	71 - 130	N/A	69-128	69-128	N/A
4-Bromofluorobenzene	59 - 148	59 - 148	N/A	64-130	64-130	N/A
1,2-Dichloroethane-D4	77 - 123	77 - 123	N/A	64-130	64-130	N/A
Semivolatile Organic Compounds, SW-846 8270C						
Benzoic Acid	44 - 116	44 - 116	36	N/A	N/A	N/A
2-Chlorophenol	54 - 97	54 - 97	31	32 - 110	32 - 110	30
4-Chloro-3-methyl phenol	59 - 102	59 - 102	27	32 - 117	32 - 117	30
2,4-Dichlorophenol	60 - 101	60 - 101	30	N/A	N/A	N/A
2,4-Dimethylphenol	49 - 89	49 - 89	31	N/A	N/A	N/A
2,4-Dinitrophenol	39 - 107	39 - 107	40	N/A	N/A	N/A
4,6-Dinitro-o-cresol	58 - 109	58 - 109	37	N/A	N/A	N/A
2-Methylphenol	53 - 94	53 - 94	29	N/A	N/A	N/A
3&4-Methylphenol	54 - 95	54 - 95	31	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	55 - 96	55 - 96	30	N/A	N/A	N/A
4-Nitrophenol	56 - 106	56 - 106	29	10 - 125	10 - 125	30
Pentachlorophenol	50 - 115	50 - 115	33	10 - 182	10 - 182	30
Phenol	55 - 99	55 - 99	28	10 - 144	10 - 144	30
2,4,5-Trichlorophenol	60 - 101	60 - 101	28	N/A	N/A	N/A
2,4,6-Trichlorophenol	60 - 100	60 - 100	27	N/A	N/A	N/A
Acenaphthene	59 - 97	59 - 97	29	10 - 200	10 - 200	30
Acenaphthylene	58 - 98	58 - 98	30	N/A	N/A	N/A
Anthracene	61 - 104	61 - 104	29	N/A	N/A	N/A
Benzo(a)anthracene	60 - 106	60 - 106	31	N/A	N/A	N/A
Benzo(a)pyrene	59 - 102	59 - 102	32	N/A	N/A	N/A
Benzo(b)fluoranthene	60 - 107	60 - 107	31	N/A	N/A	N/A
Benzo(g,h,i)perylene	56 - 103	56 - 103	32	N/A	N/A	N/A
Benzo(k)fluoranthene	61 - 107	61 - 107	30	N/A	N/A	N/A
4-Bromophenol phenyl ether	60 - 104	60 - 104	26	N/A	N/A	N/A
Butyl benzyl phthalate	57 - 110	57 - 110	28	N/A	N/A	N/A
Benzyl Alcohol	N/A	N/A	N/A	N/A	N/A	N/A
Butyl Alcohol	51 - 102	51 - 102	34	N/A	N/A	N/A
2-Chloronaphthalene	57 - 95	57 - 95	28	N/A	N/A	N/A
4-Chloroaniline	19 - 85	19 - 85	34	N/A	N/A	N/A
Carbazole	60 - 106	60 - 106	30	N/A	N/A	N/A
Chrysene	60 - 107	60 - 107	31	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	51 - 89	51 - 89	30	N/A	N/A	N/A
bis(2-Chloroethyl)ether	50 - 96	50 - 96	33	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	44 - 94	44 - 94	32	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	60 - 101	60 - 101	26	N/A	N/A	N/A
1,2-Dichlorobenzene	47 - 91	47 - 91	35	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,3-Dichlorobenzene	45 - 86	45 - 86	36	N/A	N/A	N/A
1,4-Dichlorobenzene	45 - 88	45 - 88	36	26 - 110	26 - 110	30
2,4-Dinitrotoluene	59 - 103	59 - 103	30	42 - 118	42 - 118	30
2,6-Dinitrotoluene	57 - 99	57 - 99	30	N/A	N/A	N/A
3,3'-Dichlorobenzidine	34 - 88	34 - 88	31	N/A	N/A	N/A
Dibenzo(a,h)antracene	57 - 105	57 - 105	29	N/A	N/A	N/A
Dibenzofuran	58 - 103	58 - 103	27	N/A	N/A	N/A
Di-n-butyl phthalate	59 - 105	59 - 105	27	N/A	N/A	N/A
Di-n-octyl phthalate	59 - 117	59 - 117	28	N/A	N/A	N/A
Diethyl phthalate	59 - 106	59 - 106	27	N/A	N/A	N/A
Dimethyl phthalate	60 - 100	60 - 100	26	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	57 - 111	57 - 111	29	N/A	N/A	N/A
Fluoranthene	60 - 110	60 - 110	32	N/A	N/A	N/A
Fluorene	60 - 99	60 - 99	30	N/A	N/A	N/A
Hexachlorobenzene	58 - 103	58 - 103	27	N/A	N/A	N/A
Hexachlorobutadiene	49 - 95	49 - 95	33	N/A	N/A	N/A
Hexachlorocyclopentadiene	36 - 94	36 - 94	41	N/A	N/A	N/A
Hexachloroethane	44 - 89	44 - 89	38	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	57 - 104	57 - 104	33	N/A	N/A	N/A
Isophorone	58 - 97	58 - 97	30	N/A	N/A	N/A
2-Methylnaphthalene	57 - 103	57 - 103	32	N/A	N/A	N/A
2-Nitroaniline	53 - 106	53 - 106	29	N/A	N/A	N/A
3-Nitroaniline	29 - 85	29 - 85	31	N/A	N/A	N/A
4-Nitroaniline	49 - 104	49 - 104	31	N/A	N/A	N/A
Naphthalene	54 - 93	54 - 93	32	N/A	N/A	N/A
Nitrobenzene	53 - 92	53 - 92	32	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	49 - 94	49 - 94	28	30 - 121	30 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine	53 - 107	53 - 107	28	N/A	N/A	N/A
Phenanthrene	61 - 103	61 - 103	32	N/A	N/A	N/A
Pyrene	58 - 109	58 - 109	33	10 - 200	10 - 200	30
Diphenylamine	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	52 - 93	52 - 93	32	33 - 110	33 - 110	30
Surrogates						
2-Fluorophenol	40 - 102	40 - 102	N/A	35-105	35-105	N/A
Phenol-d5	41 - 100	41 - 100	N/A	40-100	40-100	N/A
2,4,6-Tribromophenol	42 - 108	42 - 108	N/A	35-125	35-125	N/A
Nitrobenzene-d5	40 - 105	40 - 105	N/A	35-100	35-100	N/A
2-Fluorobiphenyl	43 - 107	43 - 107	N/A	45-105	45-105	N/A
Terphenyl-d14	45 - 119	45 - 119	N/A	30-125	30-125	N/A
Nitroaromatics and Nitroamines, SW-846 8330						
HMX	75 - 156	75 - 156	27	75 - 125	75 - 125	N/A
RDX	77 - 131	77 - 131	28	70 - 135	70 - 135	N/A
1,3-Dinitrobenzene	82 - 134	82 - 134	20	80 - 125	80 - 125	N/A
2,6-Dinitrotoluene	86 - 142	86 - 142	17	80 - 120	80 - 120	N/A
2,4-Dinitrotoluene	74 - 129	74 - 129	18	80 - 125	80 - 125	N/A
2-amino-4,6-Dinitrotoluene	83 - 123	83 - 123	22	80 - 125	80 - 125	N/A
4-amino-2,6-Dinitrotoluene	85 - 137	85 - 137	18	80 - 125	80 - 125	N/A
Nitrobenzene	82 - 138	82 - 138	19	75 - 125	75 - 125	N/A
o-Nitrotoluene	85 - 129	85 - 129	21	75 - 120	75 - 120	N/A
m-Nitrotoluene	85 - 136	85 - 136	22	80 - 125	80 - 125	N/A
p-Nitrotoluene	86 - 133	86 - 133	19	75 - 125	75 - 125	N/A
Tetryl	53 - 124	53 - 124	22	10 - 150	10 - 150	N/A
1,3,5-Trinitrobenzene	81 - 138	81 - 138	24	75 - 125	75 - 125	N/A
2,4,6-Trinitrotoluene	70 - 137	70 - 137	29	55 - 140	55 - 140	N/A
Surrogates						
3,4-Dinitrotoluene	72 - 145	72 - 145	N/A	78-108	78-108	N/A
PCBs, SW-846 8082						

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Aroclor-1016	69 - 117	69 - 117	26	10 - 199	10 - 199	30
Aroclor-1260	71 - 121	71 - 121	30	10 - 199	10 - 199	30
Surrogates						
Tetrachloro-m-xylene	44 - 126	44 - 126	N/A	40-140	40-140	N/A
Decachlorobiphenyl	39 - 157	39 - 157	N/A	60-125	60-125	N/A
Metals, SW-846 6010B/7470A						
Aluminum	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Total Organic Carbon (TOC) SW-846 9060						
TOC			25			

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

APPENDIX F

CHEMICAL ANALYTICAL DATA SUMMARY

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Explosives																									
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrobenzene, 1,3-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrotoluene, 2,4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrotoluene, 2,6-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
HMX	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrobenzene	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 2-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 3-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
RDX	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Tetryl	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Semivolatiles																									
3-Methylphenol and 4-Methylph	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Acenaphthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Acenaphthylene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
ACETOPHENONE	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Atrazine	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(a)pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(b)fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(ghi)perylene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(k)fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzoic acid	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Benzyl alcohol	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
BIBENZENE	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Butyl benzyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Caprolactam	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloroaniline, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloronaphthalene, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chlorophenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chrysene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dibenz(a,h)anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dibenzofuran	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.103	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Diethyl phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dimethyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Di-n-butyl phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dinitrophenol, 2,4-	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Di-n-octyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.138	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Fluorene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.105	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorobenzene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorobutadiene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachloroethane	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Isophorone	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Methylnaphthalene, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.0264	J	J	0.21	U	U
Methylphenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Naphthalene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitroaniline, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitroaniline, 3-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nitroaniline, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrobenzene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrophenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrophenol, 4-	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pentachlorophenol	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Phenanthrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Phenol	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.124	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pesticides/PCBs																									
Aroclor 1016	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1221	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1232	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1242	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1248	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1254	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1260	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Metals - Unfiltered																									
Aluminum	mg/kg	4660			10100			11000			2030			6020			9910			5020			11400		
Antimony	mg/kg	0.12	B	J	2.1	U	U	2	U	U	0.14	B	J	0.23	B	J	5.3	U	U	1.2	U	U	1.9	U	U
Arsenic	mg/kg	3.1			7.9			8.4			34.6			3.8			7			9			12.5		
Barium	mg/kg	18.5			73.8			79.7			23.9			44			62.7			31.6			84.6		
Beryllium	mg/kg	0.24	B	J	0.52			0.58			0.061	B	J	0.5			0.62	B	J	0.32			0.63		
Cadmium	mg/kg	0.21	U	U	0.15	B	J	0.33	B	J	0.16	U	U	0.52			0.46	B	J	0.17	B	J	0.33	B	J
Calcium	mg/kg	727			5470			13800			447			4140			3230			2340			3110		
Chromium	mg/kg	7.8			15.4			17.1			3.9			10.7			15.3			8.7			17.8		
Cobalt	mg/kg	3.1			8.3			18			0.79	B	J	9.5			14.1			3.3			14.1		
Copper	mg/kg	6			19.4			24.9			3.3			18.3			18.1			7.5			24.8		
Iron	mg/kg	8320			18800			22300			7840			17300			17100			12700			26000		
Lead	mg/kg	4.8			10.7			11.8			5.5			29.8			10.3			7.2			12.8		
Magnesium	mg/kg	614			3710			6100			274			1180			2260			1090			3950		
Manganese	mg/kg	30.6			316			721			23.7			188			401			148			230		J
Mercury	mg/kg	0.013	B	J	0.021	B	J	0.019	B	J	0.022	B	J	0.037	B	J	0.076	B	J	0.034	B	J	0.02	B	J

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

	Location Code:	CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
	Sample Number:	CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
	Sample Date:	20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
	Sample Depth:	0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
	Sample Purpose:	REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nickel	mg/kg	7.8			23.1			36			2.3			13.6			34.1			9.4			37.2		
Potassium	mg/kg	212	B	J	744	B	J	1550			202	B	J	435	B	J	770	B	J	400	B	J	1390		
Selenium	mg/kg	1.1	U	U	2.1	U	U	0.53	B	J	0.82	U	U	1.2	U	U	5.3	U	U	1.2	U	U	1.9	U	U
Silver	mg/kg	0.53	U	U	1	U	U	0.98	U	U	0.41	U	U	0.62	U	U	2.7	U	U	0.6	U	U	0.97	U	U
Sodium	mg/kg	530	U	U	1000	U	U	980	U	U	111	B	J	620	U	U	2700	U	U	111	B	J	970	U	U
Thallium	mg/kg	0.53	U	U	0.52	U	U	0.29	B	J	0.41	U	U	0.62	U	U	0.53	U	U	0.6	U	U	0.41	B	J
Vanadium	mg/kg	15.4			25.2			21.8			8			18.1			18.7			16.6			23.2		
Zinc	mg/kg	21.3			43.9			57.6			9.4			157			163			21.1			57		
General Chemistry																									
% Solids	Percent	83.3			78.7			76.9			83.1			79.7			79.8			82.9			78.2		
Total organic carbon	Percent	0.27			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Explosives																			
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrobenzene, 1,3-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
HMX	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrobenzene	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 2-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 3-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
RDX	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Tetryl	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Semivolatiles																			
3-Methylphenol and 4-Methylph	mg/kg	0.21	U	U	0.49	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Acenaphthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Acenaphthylene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
ACETOPHENONE	mg/kg	-	-	-	0.12	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Atrazine	mg/kg	-	-	-	0.25	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	mg/kg	-	-	-	0.12	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(a)pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(b)fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(ghi)perylene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(k)fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzoic acid	mg/kg	1.1	U	U	-	-	-	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Benzyl alcohol	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
BIBENZENE	mg/kg	-	-	-	0.061	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-chloroethyl)ether	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Butyl benzyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Caprolactam	mg/kg	-	-	-	0.4	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloroaniline, 4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloronaphthalene, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chlorophenol, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chrysene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dibenz(a,h)anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dibenzofuran	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,2-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,3-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,4-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.43	U	U	0.12	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dichlorophenol, 2,4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Diethyl phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dimethyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dimethylphenol, 2,4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Di-n-butyl phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.43	U	U	0.18	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dinitrophenol, 2,4-	mg/kg	1.1	U	U	0.4	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Dinitrotoluene, 2,4-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dinitrotoluene, 2,6-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Di-n-octyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.0313	J	J	0.22	U	U	0.21	U	U
Fluorene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorobenzene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorobutadiene	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorocyclopentadiene	mg/kg	0.21	U	U	0.4	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachloroethane	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Isophorone	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Methylnaphthalene, 2-	mg/kg	0.21	U	U	0.025			0.2	U	U	0.0334	J	J	0.22	U	U	0.21	U	U
Methylphenol, 2-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Naphthalene	mg/kg	0.21	U	U	0.02			0.2	U	U	0.183	J	J	0.22	U	U	0.21	U	U
Nitroaniline, 2-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitroaniline, 3-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nitroaniline, 4-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrobenzene	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrophenol, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrophenol, 4-	mg/kg	1.1	U	U	0.4	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
n-Nitrosodiphenylamine	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pentachlorophenol	mg/kg	1.1	U	U	0.18	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Phenanthrene	mg/kg	0.21	U	U	0.009			0.2	U	U	0.0255	J	J	0.22	U	U	0.21	U	U
Phenol	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.0309	J	J	0.22	U	U	0.21	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pesticides/PCBs																			
Aroclor 1016	mg/kg	0.021	U	U	0.08	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1221	mg/kg	0.021	U	U	0.062	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1232	mg/kg	0.021	U	U	0.056	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1242	mg/kg	0.021	U	U	0.049	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1248	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1254	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1260	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Metals - Unfiltered																			
Aluminum	mg/kg	13100			10000			6900			5480			8830		J	8400		
Antimony	mg/kg	2.3	U	U	1.4	J	J	3.8	U	U	0.17	B	J	0.13	B	J	0.16	B	J
Arsenic	mg/kg	10.1			19			5.9			24.6			8.4		J	8.3		
Barium	mg/kg	79.8			100			53.6			46.5			55.1		J	42.5		
Beryllium	mg/kg	0.67			0.51			0.36			0.26	B	J	0.44		J	0.41		
Cadmium	mg/kg	0.38	B	J	0.51	U	U	0.76	U	U	0.8			0.57		J	0.65		
Calcium	mg/kg	2910			2600			50000			1080			19800		J	26500		
Chromium	mg/kg	20.1			18			14.5			13			13		J	12.1		
Cobalt	mg/kg	15.7			11			6.4			3.3	B	J	9.7		J	6.5		
Copper	mg/kg	26.7			30			17.6			12			19.9		J	19		
Iron	mg/kg	20700			43000			13200			31700			19100		J	15200		
Lead	mg/kg	10.6			14			12.5			7.6			11.4			12.1		
Magnesium	mg/kg	3710			3100	B		12500			748			8220		J	6880		
Manganese	mg/kg	461		J	290			249			93.6			279		J	217		
Mercury	mg/kg	0.031	B	J	0.022	J	J	0.015	B	J	0.049	B	J	0.018	B	J	0.015	B	J

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nickel	mg/kg	39			36			17.5			9.8			24.7		J	19.9		
Potassium	mg/kg	1210			1000			1220			716			1280		J	1470		
Selenium	mg/kg	2.3	U	U	2	U	U	3.8	U	U	1.4	U	U	1.1	U	UJ	1	U	U
Silver	mg/kg	1.2	U	U	0.51	U	U	0.47	U	U	0.074	B	J	0.57	U	UJ	0.5	U	U
Sodium	mg/kg	1200	U	U	510	U	U	115	B	J	89.5	B	J	92.3	B	J	96.7	B	J
Thallium	mg/kg	0.58	U	U	1.5	J	J	1.9	U	U	0.64	B	J	0.38	B	J	0.5	U	U
Vanadium	mg/kg	28.9			30			14.7			22.8			17.1		J	14.3		
Zinc	mg/kg	62.9			74			50.5			27.9			44.7		J	37.5		
General Chemistry																			
% Solids	Percent	78.9			-	-	-	80.5			74			76.5			79.1		
Total organic carbon	Percent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Laboratory and data validation qualifier definitions are presented in Table 5 of Appendix H.
"-" = Not Analyzed
LQ - Laboratory qualifier. REG = Regular field Sample
mg/kg - Milligrams per kilogram. FS = Field Split
VQ - Validation qualifier. FD = Field Duplicate
The laboratory LOQ is presented for all non-detect constituents.

APPENDIX G

DETECTED HITS SUMMARY

Appendix G

Ash Pit 1 Coal Yard
Detected Hits Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008			CY0009		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			.5 - 1.5 Ft			3 - 5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG			FD		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Semivolatiles																												
Dibenzofuran	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.103	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Fluoranthene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.138	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Fluorene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.105	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Methylnaphthalene, 2-	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.0264	J	J	U	U	U	U	U	U
Naphthalene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Phenanthrene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Pyrene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.124	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Metals - Unfiltered																												
Aluminum	mg/kg	4660			10100			11000			2030			6020			9910			5020			11400			13100		
Antimony	mg/kg	0.12	B	J	U	U	U	U	U	U	0.14	B	J	0.23	B	J	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	mg/kg	3.1			7.9			8.4			34.6			3.8			7			9			12.5			10.1		
Barium	mg/kg	18.5			73.8			79.7			23.9			44			62.7			31.6			84.6			79.8		
Beryllium	mg/kg	0.24	B	J	0.52			0.58			0.061	B	J	0.5			0.62	B	J	0.32			0.63			0.67		
Cadmium	mg/kg	U	U	U	0.15	B	J	0.33	B	J	U	U	U	0.52			0.46	B	J	0.17	B	J	0.33	B	J	0.38	B	J
Calcium	mg/kg	727			5470			13800			447			4140			3230			2340			3110			2910		
Chromium	mg/kg	7.8			15.4			17.1			3.9			10.7			15.3			8.7			17.8			20.1		
Cobalt	mg/kg	3.1			8.3			18			0.79	B	J	9.5			14.1			3.3			14.1			15.7		
Copper	mg/kg	6			19.4			24.9			3.3			18.3			18.1			7.5			24.8			26.7		
Iron	mg/kg	8320			18800			22300			7840			17300			17100			12700			26000			20700		
Lead	mg/kg	4.8			10.7			11.8			5.5			29.8			10.3			7.2			12.8			10.6		
Magnesium	mg/kg	614			3710			6100			274			1180			2260			1090			3950			3710		
Manganese	mg/kg	30.6			316			721			23.7			188			401			148			230		J	461		J
Mercury	mg/kg	0.013	B	J	0.021	B	J	0.019	B	J	0.022	B	J	0.037	B	J	0.076	B	J	0.034	B	J	0.02	B	J	0.031	B	J
Nickel	mg/kg	7.8			23.1			36			2.3			13.6			34.1			9.4			37.2			39		
Potassium	mg/kg	212	B	J	744	B	J	1550			202	B	J	435	B	J	770	B	J	400	B	J	1390			1210		
Selenium	mg/kg	U	U	U	U	U	U	0.53	B	J	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Silver	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Sodium	mg/kg	U	U	U	U	U	U	U	U	U	111	B	J	U	U	U	U	U	U	111	B	J	U	U	U	U	U	U
Thallium	mg/kg	U	U	U	U	U	U	0.29	B	J	U	U	U	U	U	U	U	U	U	U	U	U	0.41	B	J	U	U	U
Vanadium	mg/kg	15.4			25.2			21.8			8			18.1			18.7			16.6			23.2			28.9		
Zinc	mg/kg	21.3			43.9			57.6			9.4			157			163			21.1			57			62.9		
Water Quality Parameters																												
% Solids	Percent	83.3			78.7			76.9			83.1			79.7			79.8			82.9			78.2			78.9		

Appendix G

Ash Pit 1 Coal Yard
Detected Hits Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location:		CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Semivolatiles																
Dibenzofuran	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Fluoranthene	mg/kg	U	U	U	U	U	U	0.0313	J	J	U	U	U	U	U	U
Fluorene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Methylnaphthalene, 2-	mg/kg	0.025			U	U	U	0.0334	J	J	U	U	U	U	U	U
Naphthalene	mg/kg	0.02			U	U	U	0.183	J	J	U	U	U	U	U	U
Phenanthrene	mg/kg	0.009			U	U	U	0.0255	J	J	U	U	U	U	U	U
Pyrene	mg/kg	U	U	U	U	U	U	0.0309	J	J	U	U	U	U	U	U
Metals - Unfiltered																
Aluminum	mg/kg	10000			6900			5480			8830		J	8400		
Antimony	mg/kg	1.4	J	J	U	U	U	0.17	B	J	0.13	B	J	0.16	B	J
Arsenic	mg/kg	19			5.9			24.6			8.4		J	8.3		
Barium	mg/kg	100			53.6			46.5			55.1		J	42.5		
Beryllium	mg/kg	0.51			0.36			0.26	B	J	0.44		J	0.41		
Cadmium	mg/kg	U	U	U	U	U	U	0.8			0.57		J	0.65		
Calcium	mg/kg	2600			50000			1080			19800		J	26500		
Chromium	mg/kg	18			14.5			13			13		J	12.1		
Cobalt	mg/kg	11			6.4			3.3	B	J	9.7		J	6.5		
Copper	mg/kg	30			17.6			12			19.9		J	19		
Iron	mg/kg	43000			13200			31700			19100		J	15200		
Lead	mg/kg	14			12.5			7.6			11.4			12.1		
Magnesium	mg/kg	3100	B		12500			748			8220		J	6880		
Manganese	mg/kg	290			249			93.6			279		J	217		
Mercury	mg/kg	0.022	J	J	0.015	B	J	0.049	B	J	0.018	B	J	0.015	B	J
Nickel	mg/kg	36			17.5			9.8			24.7		J	19.9		
Potassium	mg/kg	1000			1220			716			1280		J	1470		
Selenium	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Silver	mg/kg	U	U	U	U	U	U	0.074	B	J	U	U	U	U	U	U
Sodium	mg/kg	U	U	U	115	B	J	89.5	B	J	92.3	B	J	96.7	B	J
Thallium	mg/kg	1.5	J	J	U	U	U	0.64	B	J	0.38	B	J	U	U	U
Vanadium	mg/kg	30			14.7			22.8			17.1		J	14.3		
Zinc	mg/kg	74			50.5			27.9			44.7		J	37.5		
Water Quality Parameters																
% Solids	Percent	-	-	-	80.5			74			76.5			79.1		

Laboratory and data validation qualifier definitions are presented in Table 5 of Appendix H.

"-" = Not Analyzed
"U" = Not Detected
LQ - Laboratory qualifier.
REG = Regular field Sample
mg/kg - Milligrams per kilogram.
FS = Field Split
VQ - Validation qualifier.
FD = Field Duplicate
The laboratory LOQ is presented for all non-detect constituents.

APPENDIX H

DATA QUALITY EVALUATIONS

DATA QUALITY EVALUATION

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List of Acronyms

CCAL	continuing calibration
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
ICAL	initial calibration
ICP	inductively coupled plasma
ICS	interference check sample
LCS	laboratory control sample
MDL	method detection limit
MQL	method quantitation limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
PBOW	Plum Brook Ordnance Works
PQL	practical quanitation limit
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
Shaw	Shaw Environmental, Inc.
RPD	relative percent difference

1.0 Introduction

This appendix presents results of the quality assurance (QA)/quality control (QC) measures implemented for the sampling and analysis activities at Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The quality indicators from every aspect of the data collection were reviewed, and an assessment of the data with regard to project-specific objectives is presented. Successful execution of project-specific objectives and procedures provides strong support for the acceptance of the data generated as adequate for the purpose of evaluating the analytical results from this assessment at PBOW.

Shaw Environmental, Inc. (Shaw) conducted investigative work at the Coal Yard 1 area; sampling was performed in December 2011. Primary and field duplicate project samples were analyzed by Accutest Laboratories, of Orlando, Florida. Field split samples were submitted to Test America Laboratories, Inc. of North Canton, Ohio, for analysis. All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) the QA project plan, and EPA Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (April 1993). Since these documents specify procedures for Contract Laboratory Program data, they are used as guidelines only. Method and laboratory QA and QC requirements supersede these guidelines, where applicable. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness and comparability goals established to meet the project data quality objectives (DQO). To verify that these DQOs were met, field measurements, sampling and handling procedures, laboratory analysis and reporting, and all nonconformances and discrepancies in the data were examined to determine compliance with the appropriate and applicable procedures defined in the sampling and analysis plan (SAP). The results of this review are presented in the following sections, with all analytical outliers or nonconformances discussed where they occurred.

This report is divided into three sections. Section 2.0 discusses the field investigation and QC procedures used during the sampling effort. Section 3.0 outlines the analytical program and the associated QC activities performed. The final part of this document, Section 4.0, summarizes the data findings and their overall impact on the usability of the analytical data.

2.0 Field Sampling and Quality Control Activities

Shaw was retained by the U. S. Army Corps of Engineers Nashville District to conduct investigative and sampling activities at PBOW. Field activities at this site included collection of soil samples. The collection of these samples and their associated QC samples are discussed in this section of the data quality evaluation. Thirteen project samples and one field duplicate soil sample were submitted to Accutest for analysis. Sample shipments from the field were performed under custody and documented using standard Shaw analysis request/chain-of-custody forms. These forms provided project-specific analytical specifications and QC instructions to the laboratory. A formal chain-of-custody transfer record was prepared and included with these forms to document custody during sample transportation, storage, and disposition by the laboratory. Table 1 summarizes the field sample number, location, sample type, date of collection, lot number, and laboratory for each sample collected.

2.1 Equipment Rinsates

Equipment rinsates are used to assess the effectiveness of the decontamination procedures used by the sampling team on reusable sampling equipment. No equipment rinsate samples were collected during this sampling event.

2.2 Field Duplicates

Field duplicate samples are collected and submitted to the laboratory for analysis along with their corresponding original sample. The data generated from the analysis of field duplicate samples are used to evaluate the precision of the sample collection and analysis procedures. It is difficult to collect and analyze soil samples in duplicate due to the heterogeneous nature of soil. High relative percent difference (RPD) between an original sample and its field duplicate may indicate a difference in sample matrix or sample collection rather than true problems with precision of sample analysis. Also, when estimated (“J”) or nondetected (“U”) results are reported, there is a potential for increased variability between the primary and duplicate sample results.

Field duplicate samples were collected at a frequency of 1 for every 10 samples (10 percent). One field duplicate soil sample was collected during this sampling event. Table 2 compares the original and field duplicate results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field duplicate samples. Sample sets with no detections are not presented in the table. In cases where duplicates were performed and one result is less than the reporting limit but greater than the method

detection limit, the RPD is reported but is of limited value. Only samples with detections in both the regular and the duplicate were qualified for high RPDs.

The acceptance criterion of 30 percent RPD for waters and 50 percent RPD for soils was used to evaluate these sample results. The RPD value for manganese in sample/duplicate pair CY0008/CY0009 exceeded the acceptance criteria resulting in the qualification of data. Overall, the data compared well when detected concentrations were greater than the reporting limit. RPD is calculated by using the following formula:

$$RPD = \left| \frac{A - B}{(A + B)/2} \right| \quad x \quad 100$$

where:

RPD	=	relative percent difference
A	=	original result
B	=	field duplicate result.

2.3 Field Split Samples

Split samples were collected in conjunction with field duplicate samples and sent to Test America Laboratories, Inc. of North Canton. The split samples were submitted to the laboratory for the same analyses as their corresponding field duplicates and original field samples. The split samples are used to determine if data results are reproducible when analyzed by two different laboratories. Results are also evaluated to determine if a contracted laboratory's preparation and analysis procedures are in control and meet the approved method criteria.

Field split samples were collected at a frequency of approximately 1 for every 10 regular samples. One soil field split sample was collected during this sampling event. Table 2 compares the original and field split results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field split samples. Samples with no detections are not presented in the table. Field split samples were not qualified for RPD criterion.

3.0 Analytical Program and Quality Control Activities

The project QA/QC program described in the SAP was followed for the collection and laboratory analysis of samples. Each of the analytical methods used require that method-specific QA/QC

protocols be followed during sample analysis. These protocols are a critical part of the methods employed and were followed by the laboratory during sample analysis. Specific measures included detailed record-keeping procedures, instrument calibrations, and analysis of method blanks, blank spikes, matrix spike (MS)/matrix spike duplicate (MSD), surrogates, and internal standards. The following SW-846 and EPA methods were used to analyze PBOW samples:

Analysis	Method
Semivolatiles	SW-846 3550C/8270D
Nitroaromatics	SW-846 8330A
Metals	SW-846 3050B/6010C/7471B
Polychlorinated Biphenyls	SW-846 3550C/8082A
Wet Chemistry	Total Organic Carbon by Walkley Black

The validator used the QA/QC criteria defined in the SAP, laboratory-derived acceptance criteria, and analytical method criteria to qualify data. Any qualifiers added to these data by the data validator are included in the data summary report.

3.1 Laboratory Quality Assurance/Quality Control Procedures

The following sections discuss specific QA/QC protocols required and performed by the laboratory during this investigation.

3.1.1 Calibration

The calibration of instruments is required to ensure that the instruments are operating properly. Calibration is achieved when instrument response can be related to the concentration of an analyte. All analytes met QC criteria for initial calibration (ICAL) percent relative standard deviation and/or continuing calibration (CCAL) percent difference. The following criteria are used to evaluate the data: individual ICAL percent relative standard deviation +/- 30 percent and/or CCAL percent difference +/- 20 percent (volatile and semivolatile organics); +/-15 percent (explosives); for metals, individual ICAL/CCAL percent relative standard deviation +/- 10 percent; and for mercury, individual ICAL/CCAL percent relative standard deviation +/- 20 percent. No sample qualification was required.

3.1.2 Method/Calibration Blanks

Method blanks are analyzed with each analytical "batch" processed on a per matrix (i.e., soil and water) basis. Method blanks are carried step-wise through the same analytical procedure as their associated field samples including the addition of solvents, surrogate and standard spikes, and reagents as required in the analysis process. The purpose of a method blank is to identify any

contaminants that may be introduced to the sample as a result of the analytical process. The method blank is considered acceptable by the laboratory if the concentration of any target analyte is less than ½ the reporting limit and less than 1/10 the amount measure in any sample or regulatory limit (whichever is greater). The data validator evaluated all blank data associated with each sample. The data validators evaluated all blank data associated with each sample. The third party data validation evaluation criteria for method blanks are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified “B.”
- For inorganics, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."

If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, no action is taken. All method blanks were found to be acceptable.

3.1.3 Surrogate Recoveries

Surrogate standards are defined as non-target compounds added to standards, blanks, and samples prior to extraction or purging. They are used in organic analyses to monitor the percent recovery efficiencies of the sample preparation and analytical procedures. Surrogate recoveries for the project samples all fell within acceptable QC criteria.

The surrogate control limits for this project can be found in Attachment A of Appendix E. The surrogate control limits used for evaluation are the laboratory established in-house surrogate criteria.

3.1.4 Matrix Spikes and Laboratory Control Spikes

Two types of spikes were performed for all analyses: MSs and laboratory control samples (LCS). MS compounds are spiked into an aliquot of a field sample. LCS compounds are spiked into a blank matrix. The spiked compounds are representative compounds that are quantified during performance of the method. Recovery of the spiked compound is used as an assessment of analytical accuracy for the sample matrix analyzed. These results are useful in distinguishing sample matrix interferences from analysis interferences through a comparison of MS and LCS recovery data. Often, spikes are performed in duplicate as an MSD or LCS duplicate. In this

manner, the precision of the assessment can be quantified as the RPD of the original and duplicate spike.

MSs were assigned at a frequency of at least 1 for every 20 field samples collected. One MS/MSD pair, CY0013-MS/MSD, was assigned to samples. Additional sample volume was provided to the laboratory for the MS/MSD analyses. This sampling frequency meets the collection criteria for this program as specified in the SAP. In addition to the overall collection frequency, the analytical method requires that the laboratory analyze one set of spikes per analytical batch. To comply with this method requirement, the laboratory may analyze additional MS/MSD pairs. The validator evaluated all batch QC. The laboratory's statistically determined target acceptance limits were used to assess the spike recovery and RPD.

The following MS/MSD recoveries are outside of established QC criteria:

Sample Delivery Group	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc	J/UJ

LCS results are used to evaluate laboratory method performance in the same manner as the MS/MSD results, except the LCS is not performed on an actual field sample matrix. The LCS is prepared for each analytical batch and for each parameter and matrix analyzed. All LCS recoveries met QC criteria.

The LCS and MS/MSD control limits for this project can be found in Attachment A of Appendix E. The LCS and MS/MSD control used for evaluation are the laboratory established in-house control limits. Detected constituents with associated MS/MSD recoveries above or below the QC limits were qualified as estimated “J”. Sample results with associated MS/MSD or LCS recoveries below the QC limits were qualified as estimated non-detects “UJ”.

3.1.5 Laboratory Duplicate Sample Analysis

Laboratory duplicate determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate sample analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. Laboratory duplicates are not required for nitoraromatic analysis. All laboratory duplicate sample analysis met QC criteria with the following exception:

Sample Delivery Group	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Barium	J

3.1.6 Column Agreement

For high-performance liquid chromatography analyses, sample results are confirmed using two dissimilar columns. In order for an analyte to be reported, it must be detected on both columns. Results differing by greater than 40 percent are qualified estimated (J); however, for this sampling event, all detections were in agreement.

3.1.7 Interference Check Sample and Post Digestion Spike

The ICP Interference Check Sample (ICS) verifies the contract laboratory's interelement and background correction factors. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and solution AB consists of the analytes mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with solution A, for all wavelengths used for each analyte reported by ICP. Results for the ICP analysis of the ICS solution AB must fall within the control limits of $\pm$ 20% of the true value for the analytes included in the solution. All Interference Check Sample (ICS) percent recoveries were acceptable.

Post Digestion spikes are elements added to a portion of a prepared sample to verify the absence or presence of matrix effects for ICP and ICP/MS analysis. To verify the absence of interference, the spike recovery must be between 75% and 125%. Results outside the acceptance limits require a method of standard additions (MSA) for all samples within the batch. All post digestion spike recoveries were found to be acceptable.

3.1.8 Inductively Coupled Plasma Serial Dilutions

The ICP serial dilution analysis is performed to determine whether or not significant physical or chemical interferences exist due to sample matrix. All QC criteria were met for the serial dilutions associated with the project samples, with the following exceptions:

Sample Delivery Group	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Aluminum, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Vanadium, Zinc	J

3.2 Reporting Limits

Limits have been established to describe project sensitivity requirements. Each laboratory is required to demonstrate method performance through method detection limit (MDL) studies for every method employed. These studies are required to be laboratory-specific so that individual laboratory variables such as equipment brands, reagent suppliers, and chemist technique are factored into the performance study. MDLs are established using controlled matrices (i.e., deionized water). Practical quantitation limits (PQL) or method quantitation limits (MQL) used for this project are those statistically determined by the laboratories. The analytical program executed for this project required the use of SW-846 methods, which specify the procedure for calculating the MDLs. The PQL/MQL calculation adjusts the limit by a predetermined mathematical factor for the analysis of actual environmental sample matrices (i.e., soil, groundwater, etc.). Method reporting limits (MRL) are based on the project action or decision levels.

These limits are generally defined as follows:

- ***MDL.*** The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the concentration is greater than zero.
- ***MQL/PQL.*** The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. It is set at the lowest standard used for the calibration curve.
- ***MRL.*** A threshold value below which the laboratory reports a result as nondetected. Ideally, the MRL will be established anywhere between the MDL and 1/2 the project action levels.

An MDL is the lower limit at which the laboratory can differentiate a measurement from background. The MDL is determined in accordance with the procedures in 40 Code of Federal Regulations Part 136. If project action levels are near or below the MDL, it is unlikely the sensitivity of the method will be achievable. A compromise must be reached. The PQL/MQL is the lower limit at which a measurement becomes meaningful. This measurement (the PQL or the reporting limit) is generally a multiple of three to five times the MDL.
Most samples were handled and analyzed as expected without significant changes to the anticipated project MQLs.

3.3 Holding Times/Preservation

All laboratory results submitted for this investigation have been reviewed with respect to laboratory adherence to extraction and analysis holding times. All hold times and preservation requirements were met. No qualification was required.

4.0 Data Evaluation and Usability

The analytical data review process identified a few analytical nonconformance issues that were noted during this analytical program. These anomalies have been discussed in the previous sections of this appendix. Table 3 summarizes all compounds requiring qualifier application due to anomalies discovered during data validation. Table 4 defines the reason codes for qualification, and Table 5 defines the data validation qualifiers.

The following definitions are used for defining precision, accuracy, representativeness, completeness, and comparability as they have been applied to this evaluation.

Precision. Precision is a measurement of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision data were obtained through the analysis and evaluation of duplicate QA samples. Accuracy was determined through the analysis and evaluation of method blanks, LCSs, trip blanks, equipment rinsates, and MS samples.

Accuracy. Accuracy is a measurement of bias in a system and is expressed as a percent recovery. These QA samples were collected and/or analyzed at the frequency established in the SAP, verifying the completeness element of the DQOs along with the evaluation of holding times and reporting limits. Percent recovery is calculated as follows:

$$Percent\ Recovery = \left(\frac{(x - s)}{T} \right) * 100$$

Where:

X = the laboratory determined concentration of a spiked sample
S = the sample native concentration prior to spike
T = the true concentration of the spike.

RPD is calculated as follows:

$$Relative\ Percent\ Difference = \left[\frac{|D1 - D2|}{\frac{D1 + D2}{2}} \right] * 100$$

Where:

D1 and D2 = the results of duplicate measurements.

Representativeness. Representativeness is a qualitative parameter that expresses the degree to which sample data actually represent the matrix and site conditions. For example, in conducting groundwater monitoring, representativeness requires proper location of wells and the collection of samples under consistent, documented procedures. Wells are located based upon the results of the hydrological study in progress and are designed to provide maximum coverage of the flow conditions. Requirements and procedures for sample collection and handling are designed to maximize sample representativeness. Representativeness also can be monitored by reviewing field documentation and by performing field audits.

The samples were collected using Shaw standard operating procedures (SOP) and were fully documented through the use of standard Shaw field forms. Samples are representative of the matrix and site sampled.

Completeness. Completeness is a measure of the amount of valid data that are obtained during a sampling event as compared to the amount of data planned to be collected under optimum conditions. Some data for this project were qualified as estimated in the validation process because of the outliers noted in the MS recoveries, duplicate results for certain elements, and various other calibration and column confirmation percent difference results. Completeness is calculated as follows:

$$Completeness\ \% = \left(\frac{D_r}{D_c} \right) X\ 100$$

Where:

D_r = the number of data points for which valid results are reported
D_c = the number of valid samples/data points that are collected and reach the laboratory for analysis.

During this task, 13 regular project samples, 1 field duplicate, and 1 field split sample were collected, resulting in approximately 1,525 targeted analytical records. No results were rejected. Using the above calculation, 100 percent completeness was achieved for the task.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability ensures that results for the sampling event can be compared with data from other past and/or future sampling programs. Comparability for this sampling event was achieved through the use of established and recognized techniques and accepted standard EPA methods. All samples collected and analyzed were subjected to the same sampling, handling, preparation, analysis, reporting, and validation criteria for the purpose of achieving comparability goals within the data set.

Statement of Data Usability. The overall results of the analyses, as discussed in this evaluation, suggest that representative samples were collected and analyzed, and the results are indicative of the media analyzed, with the exception of the few anomalies noted. The data do reflect expected site conditions and are usable for their intended purpose.

Tables 1, 2, 3, 4 and 5 summarize the analytical program and the results for the data validation effort for all samples collected by Shaw at PBOW Coal Yard 1 area.

TABLES

Table 1

Sample Cross Reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number	Laboratory
SS	CY1-SB01	CY0001	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB01	CY0002	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB01	CY0003	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB02	CY0004	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB02	CY0005	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB02	CY0006	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB03	CY0007	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB03	CY0008	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB03	CY0009	20-Dec-11	FD	F88938	Accutest
DS	CY1-SB03	CY0010	20-Dec-11	FS	240-7168-1	Test America
DS	CY1-SB03	CY0011	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB04	CY0012	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB04	CY0013	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB04	CY0014	20-Dec-11	REG	F88938	Accutest

SDG - Sample delivery group.

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Relative Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

		Location:	CY1-SB03		CY1-SB03		CY1-SB03		Relative	Relative
		Sample Number:	CY0008		CY0009		CY0010		Percent	Percent
		Sample Date:	20-Dec-11		20-Dec-11		20-Dec-11		Difference	Difference
		Sample Depth:	3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		REG and FD	REG and FS
		Sample Purpose:	REG		FD		FS			
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Aluminum	N	mg/kg	11400		13100		10000		13.88	13.08
Antimony	N	mg/kg	1.9	U	1.9	U	1.4	J	-	-
Arsenic	N	mg/kg	12.5		10.1		19		21.24	159.71
Barium	N	mg/kg	84.6		79.8		100		5.84	16.68
Beryllium	N	mg/kg	0.63		0.67		0.51		6.15	21.05
Cadmium	N	mg/kg	0.33	J	0.38	J	0.3	U	14.08	-
Calcium	N	mg/kg	3110		2910		2600		6.64	-
Chromium	N	mg/kg	17.8		20.1		18		12.14	1.12
Cobalt	N	mg/kg	14.1		15.7		11		10.74	24.70
Copper	N	mg/kg	24.8		26.7		30		7.38	18.98
Iron	N	mg/kg	26000		20700		43000		22.70	49.28
Lead	N	mg/kg	12.8		10.6		14		18.80	8.96
Magnesium	N	mg/kg	3950		3710		3100		6.27	24.11
Manganese	N	mg/kg	230	J	461	J	290		**66.86**	23.08
Mercury	N	mg/kg	0.02	J	0.031	J	0.022	J	43.14	9.52
Nickel	N	mg/kg	37.2		39		36		4.72	3.28
Potassium	N	mg/kg	1390		1210		1000		13.85	32.64
Thallium	N	mg/kg	0.41	J	0.058	U	1.5	J	-	114.14
Vanadium	N	mg/kg	23.2		28.9		30		21.88	25.56
Zinc	N	mg/kg	57		62.9		74		9.84	25.95

FD - Field duplicate.
FS - Field split.
mg/kg - Milligrams per kilogram.
REG - Regular field sample.
"-" = Not Calculated

Table 3

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Former Plum Brook Ordnance Works
Sandusky, Ohio

Work Order	Sample Number	Analysis	Parameter	Reason Codes				
				VQ	R1	R2	R3	R4
F88938	CY0001	METALS3	Potassium	J	15			
F88938	CY0001	METALS3	Antimony	J	15			
F88938	CY0001	METALS3	Beryllium	J	15			
F88938	CY0001	METALS3	Mercury	J	15			
F88938	CY0002	METALS3	Potassium	J	15			
F88938	CY0002	METALS3	Cadmium	J	15			
F88938	CY0002	METALS3	Mercury	J	15			
F88938	CY0003	METALS3	Thallium	J	15			
F88938	CY0003	METALS3	Cadmium	J	15			
F88938	CY0003	METALS3	Selenium	J	15			
F88938	CY0003	METALS3	Mercury	J	15			
F88938	CY0004	METALS3	Potassium	J	15			
F88938	CY0004	METALS3	Sodium	J	15			
F88938	CY0004	METALS3	Antimony	J	15			
F88938	CY0004	METALS3	Beryllium	J	15			
F88938	CY0004	METALS3	Cobalt	J	15			
F88938	CY0004	METALS3	Mercury	J	15			
F88938	CY0005	METALS3	Potassium	J	15			
F88938	CY0005	METALS3	Antimony	J	15			
F88938	CY0005	METALS3	Mercury	J	15			
F88938	CY0005	SEMIVOLATILES3	Pyrene	J	15			
F88938	CY0005	SEMIVOLATILES3	Dibenzofuran	J	15			
F88938	CY0005	SEMIVOLATILES3	Fluoranthene	J	15			
F88938	CY0005	SEMIVOLATILES3	Fluorene	J	15			
F88938	CY0006	METALS3	Potassium	J	15			
F88938	CY0006	METALS3	Beryllium	J	15			
F88938	CY0006	METALS3	Cadmium	J	15			
F88938	CY0006	METALS3	Mercury	J	15			
F88938	CY0007	METALS3	Potassium	J	15			
F88938	CY0007	METALS3	Sodium	J	15			
F88938	CY0007	METALS3	Cadmium	J	15			
F88938	CY0007	METALS3	Mercury	J	15			
F88938	CY0007	SEMIVOLATILES3	Methylnaphthalene, 2-	J	15			
F88938	CY0008	METALS3	Manganese	J	17			
F88938	CY0008	METALS3	Thallium	J	15			
F88938	CY0008	METALS3	Cadmium	J	15			
F88938	CY0008	METALS3	Mercury	J	15			
F88938	CY0009	METALS3	Manganese	J	17			
F88938	CY0009	METALS3	Cadmium	J	15			
F88938	CY0009	METALS3	Mercury	J	15			
240-7168-1	CY0010	METALS3	Thallium	J	15			
240-7168-1	CY0010	METALS3	Antimony	J	15			
240-7168-1	CY0010	METALS3	Mercury	J	15			
F88938	CY0011	METALS3	Sodium	J	15			
F88938	CY0011	METALS3	Mercury	J	15			
F88938	CY0012	METALS3	Silver	J	15			
F88938	CY0012	METALS3	Sodium	J	15			
F88938	CY0012	METALS3	Thallium	J	15			
F88938	CY0012	METALS3	Antimony	J	15			
F88938	CY0012	METALS3	Beryllium	J	15			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Former Plum Brook Ordnance Works
Sandusky, Ohio

Work	Sample			Reason Codes				
F88938	CY0012	METALS3	Cobalt	J	15			
F88938	CY0012	METALS3	Mercury	J	15			
F88938	CY0012	SEMIVOLATILES3	Pyrene	J	15			
F88938	CY0012	SEMIVOLATILES3	Fluoranthene	J	15			
F88938	CY0012	SEMIVOLATILES3	Phenanthrene	J	15			
F88938	CY0012	SEMIVOLATILES3	Naphthalene	J	15			
F88938	CY0012	SEMIVOLATILES3	Methylnaphthalene, 2-	J	15			
F88938	CY0013	METALS3	Aluminum	J	13			
F88938	CY0013	METALS3	Iron	J	13			
F88938	CY0013	METALS3	Magnesium	J	13			
F88938	CY0013	METALS3	Manganese	J	13			
F88938	CY0013	METALS3	Nickel	J	08A	13		
F88938	CY0013	METALS3	Potassium	J	08A	13		
F88938	CY0013	METALS3	Silver	UJ	08A			
F88938	CY0013	METALS3	Sodium	J	08A		15	
F88938	CY0013	METALS3	Thallium	J	15			
F88938	CY0013	METALS3	Antimony	J	08A	15		
F88938	CY0013	METALS3	Arsenic	J	08A	13		
F88938	CY0013	METALS3	Barium	J	08A	08B	13	
F88938	CY0013	METALS3	Beryllium	J	08A	13		
F88938	CY0013	METALS3	Cadmium	J	08A	13		
F88938	CY0013	METALS3	Chromium	J	08A	13		
F88938	CY0013	METALS3	Cobalt	J	08A	13		
F88938	CY0013	METALS3	Copper	J	08A	13		
F88938	CY0013	METALS3	Vanadium	J	08A	13		
F88938	CY0013	METALS3	Zinc	J	08A	13		
F88938	CY0013	METALS3	Calcium	J	13			
F88938	CY0013	METALS3	Selenium	UJ	08A			
F88938	CY0013	METALS3	Mercury	J	15			
F88938	CY0014	METALS3	Sodium	J	15			
F88938	CY0014	METALS3	Antimony	J	15			
F88938	CY0014	METALS3	Mercury	J	15			

Table 5

Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B	Indicates the analyte is found in associated method blank.
J	Indicates the analyte result is an estimated value.
ND	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
MDL	Method detection limit.
RL	Reporting limit.
E	Indicates the value exceeds the calibration range.
ND	Indicates presumptive evidence of a compound
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

APPENDIX I

CHAINS OF CUSTODY

F88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 122 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884
Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	CY0001	SOIL	12-20-11 / 1100	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082, TOC by Walkley-Black		
2	CY0002	SOIL	12-20-11 / 1115	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
3	CY0004	SOIL	12-20-11 / 1000	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
4	CY0005	SOIL	12-20-11 / 1015	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
5	CY0007	SOIL	12-20-11 / 1155	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
6	CY0008	SOIL	12-20-11 / 1205	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
7	CY0009	SOIL	12-20-11 / 1205	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
8	CY0012	SOIL	12-20-11 / 1242	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
9	CY0013	SOIL	12-20-11 / 1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver — Date: 12-21-11 Time: 1600
2. Relinquished by: FX — Date: 12/22/11 Time: 7:30
3. Relinquished by: — Date: Time:

1. Received by: FX — Date: Time:
2. Received by: [signature] ALSE — Date: 12/22/11 Time: 7:30
2. Received by: — Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB[illegible]1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 CY0013 MS	SOIL	12-20-11/1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
9 CY0013 MSD	SOIL	12-20-11/1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: Fred Jones ALSE Date: 12 22 11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
10	CY0003	SOIL	12-20-11/1145	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
11	CY0006	SOIL	12-20-11/1042	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
12	CY0011	SOIL	12-20-11/1225	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
13	CY0014	SOIL	12-20-11/1340	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X
Project Specific: ____

1. Relinquished by: Eric W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: Zl Jones ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PBOW 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
14	CY0035	SOIL	12-19-11 / 1140	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
15	CY0038	SOIL	12-19-11 / 1330	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
16	CY0041	SOIL	12-19-11 / 1555	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
17	CY0044	SOIL	12-19-11 / 1630	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: [illegible] ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB[illegible]/1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
18	CY0042	SOIL	12-19-11/1600	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
19	CY0043	SOIL	12-19-11/1610	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

EW

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: T. L. Torres ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
20	CY0031	SOIL	12-19-11 / 1105	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082, TOC by Walkley-Black		
21	CY0032	SOIL	12-19-11 / 1119	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
22	CY0033	SOIL	12-19-11 / 1119	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
23	CY0036	SOIL	12-19-11 / 1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
24	CY0037	SOIL	12-19-11 / 1310	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
25	CY0039	SOIL	12-19-11 / 1540	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040MS	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040MSD	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X
Project Specific: ____

1. Relinquished by: Eddie W. Weaver — Date: 12-21-11 Time: 1600
2. Relinquished by: — Date: Time:
3. Relinquished by: — Date: Time:

1. Received by: FX — Date: Time:
2. Received by: [signature] — Date: 12/22/11 Time: 930
2. Received by: — Date: Time:

Comments:

3.4c

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F 88938 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 12/22/11 730 {MM/DD/YY 24:00} NIMBER OF COOLERS RECEIVED: 1

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8768 6974 9869

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 25-GRAM_____ 5-GRAM_____

NUMBER OF 5035 FIELD KITS ? _____

NUMBER OF LAB FILTERED METALS ? _____

TEMPERATURE INFORMATION

- [ ] IR THERM ID 1 CORR. FACTOR +0.2
- [ ] OBSERVED TEMPS: 3.2
- [ ] CORRECTED TEMPS: 3.4

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

{APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS}

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE [signature] 12/22/11 REVIEWER SIGNATURE/DATE [signature] 12-22-11

NF 12/10

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB EW 1221 11TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mke Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Test America
Laboratory Contact: Denise Pohl
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8989-5317-7768

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CY0034	Soil	12-19-11 / 1119	Wide Mouth Glass Jar	1 8 ~~2~~ X ~~4~~ oz EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~8~~ oz	Cool	Explosives by 8330A		
CY0010	Soil	12-20-11 / 1205	Wide Mouth Glass Jar	1 8 ~~2~~ X ~~4~~ oz EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~8~~ oz	Cool	Explosives by 8330A		
	Soil		Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		
	Soil		Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		

EW

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 12-21-11 Time: 1600	1. Received by: Mike Gunderson	Date: 12/22/11 Time: 8:30
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

APPENDIX J

RESPONSE TO COMMENTS

Response to Comments - OEPA
Draft Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio
(Report dated June 2012)

Reference: Comments from Dr. Janusz Z. Byczkowski, DERR, CO, email dated July 6, 2012.

Comment 1: **Section 1.4, Page 1-3, Line #21; This document states: "…*NASA's inactive reactor, which is presently in the process of being decommissioned*…". This statement does not reflect the up to date accomplishments (as of June 2012). The term "*presently*" should correspond to the date of the document.**

Please update statements regarding condition of the Site, to correspond to the date of the document.

Response 1: Information of the present status, as of August 2012, of the nuclear reactor decommissioning will be included at the end of the referenced paragraph.

Comment 2: **Section 4.2.2, Page 4-4, Line #7; This document states: "…*Each BSC is the calculated 95th percent upper tolerance limit or the maximum detected concentration of the background data set, whichever value is lower, for each relevant analyte (IT Corporation, 1998)*…". The described method of background level (BSC) calculation is currently not recommended by OEPA-DERR (2009). Actually, the Table 5-1 may illustrate inadequacy of BSCs to this area of concern (in many cases BSCs area more than an order of magnitude higher than the respective maximum concentrations detected in this AOC). The use of methodology not recommended by OEPA-DERR should be emphasized and justified.**

Reference: OEPA-DERR (2009) **Use of Background for Remedial Response Sites. On-line:** **http://www.epa.ohio.gov/portals/30/rules/Use%20of20Background%20for%20RR%20Sites.pdf .**

Please emphasize a different background screening approach than that currently recommended by OEPA-DERR and provide justification.

Response 2: Text consistent with the following will be added to this text: *"It is noted that the method agreed upon for the development of BSCs by OEPA and USACE, as recorded in the September 11, 2002 PBOW team meeting minutes, differs from that shown in current OEPA (2009) guidance. This PBOW team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2009) guidance.*" We note that the concentrations of inorganics in Coal Yard No. 2 soil are low relative to other PBOW sites.

Reference used in the Response:

Ohio Environmental Protection Agency (OEPA), 2009***, Use of Background for Remedial Response Sites***, Technical Decision Compendium, Division of Environmental Response and Revitalization, August 21.

APPENDIX E

ASH PIT NO. 1 BHHRA ADDENDUM FOR COAL YARD NO. 1

Shaw Environmental
& Infrastructure, Inc.

Final
October 2013

Ash Pit No. 1
Baseline Human Health Risk Assessment Addendum for Coal Yard No. 1
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps of Engineers
Nashville District

CB&I
312 Directors Drive
Knoxville, TN 37923
Tel: +1 865 690 3211
Fax: +1 865 690 3626
Steven.Downey@CBIfederalservices.com

October 23, 2013

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Paula Coleman)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Subject: ***Submittal of the Final Ash Pit No. 1 Baseline Human Health Risk Assessment and Screening-Level Ecological Risk Assessment Addenda for Coal Yard No. 1 Former Plum Brook Ordnance Works, Sandusky, Ohio Contract No. W912QR-08-D-0013: Shaw Project Number 132457***

Dear Ms. Coleman:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 awarded to Shaw Environmental & Infrastructure, Inc., a CB&I company, we are pleased to submit the Final Addenda to the Ash Pit No.1 (AP1) Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment for Coal Yard No. 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report was prepared consistent with other PBOW risk assessment reports, U.S. Environmental Protection Agency guidance, and the AP1 risk assessment work plan.

Enclosed for your records are four copies of this report. Copies have also been sent to those on the distribution list as indicated for their records. As requested, the document was sent to the Center of Expertise (CX) and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven. T. Downey, PE, PMP
Project Manager

Please Reply To: Steven T. Downey
Phone: 865 694 7496
E-Mail Address: Steven.Downey@CBIfederalservices.com

Control Copy Distribution List

Name	Control Copy
U.S. Army Engineer District, Nashville ATTN: CELRN-EC-E (Ms. Paula Coleman) 110 Ninth Avenue South, Room 682 Annex Nashville, TN 37203	1-4
U.S. Army Engineer District, Huntington ATTN: CELRH-PM-PP-P (Mr. Rick Meadows) 502 Eighth Street Huntington, West Virginia 25701-2070	5-7 (CD provided)
Mr. Paul Jayko Site Coordinator Division of Emergency and Remedial Response (DERR) Ohio Environmental Protection Agency 347 North Dunbridge Road Bowling Green, Ohio 43402-0466	8, 9
Mr. Brian Tucker Ohio Environmental Protection Agency Division of Emergency and Remedial Response (DERR) Central Office Lazarus Government Center 50 W. Town Street, Suite 700 Columbus, OH 43216-1049	10
Mr. Robert Lallier Environmental Coordinator NASA - Plum Brook Station 6100 Columbus Avenue Sandusky, Ohio 44870	11
U.S. Army Corps of Engineers (**electronic only**) HTRW Center of Expertise ATTN: CEHNC-CX-EG (Vern StJohn) 1616 Capitol Avenue Omaha, Nebraska 68144-3869	(CD provided)
Mr. John Blakeman (**electronic only**) PBOW RAB Co-chairman 2412 Scheid Road Huron, Ohio 44839	(CD provided)
Mr. Jeffrey G. Leach US Army Public Health Command ATTN: MCHB-IP-REH, BLDG E1675 Aberdeen Proving Grounds, MD 21010-5403	12

DISCIPLINE SIGN-OFF REVIEW

Shaw Environmental & Infrastructure, Inc.

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 1 BHHRA Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 44000000

Document Type		Identify specific section or segment covered by this checkprint
☐	Technical / Cost Proposal	
☐	RFP	
☐	Contract / Subcontract	
☐	Work Plans	
☐	Report	
X	Risk Assessment / Evaluation	BHHRA Addendum
☐	Specifications & Plans	
☐	Design Calculations	
☐	Tables	
☐	Drawings / Figures	
☐	Other:	

Document Origin

- X Originator Developed
- ☐ Edited Standard
- ☐ Client Furnished

Document Status

- ☐ Preliminary
- ☐ Internal Draft
- ☐ Draft
- ☐ Draft Final
- X Final
- ☐ Other:

	Required Person	Signature	Date
Originator	Tom Siard		10-23-13
Editor	Donald Groseclose	Deborah K. Chafin	10-23-13
Peer Review	Jon Lindberg		10-23-13
Technical Review	Michael Gunderson		10-23-13
Quality Assurance Mgr	Ken Martinez		10-23-13
Project Manager	Steven Downey		10-23-13

NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 1
Baseline Human Health Risk Assessment Addendum
For Coal Yard No. 1
FUDS No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

Prepared for:

U.S. Army Corps of Engineers
P.O. Box 1070
Nashville, Tennessee 37202-1070

Prepared by:

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)
312 Directors Drive
Knoxville, Tennessee 37923

Shaw Project No. 132457

October 2013

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List of Acronyms

AP1	Ash Pit No. 1
AP3	Ash Pit No. 3
BHHRA	baseline human health risk assessment
BSC	background screening concentration
COPC	chemical of potential concern
DERP	Defense Environmental Restoration Program
DNT	dinitrotoluene
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Sites
GSA	General Services Administration
HQ	hazard quotient
ICI	International Consultants Incorporated
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	incremental lifetime cancer risk
IT	IT Corporation
MDC	maximum detected concentration
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OEPA	Ohio Environmental Protection Agency
PAH	polycyclic aromatic hydrocarbon
PBOW	Plum Brook Ordnance Works
PDT	Project Delivery Team
RBSC	risk-based screening concentration
RSL	regional screening level
Shaw	Shaw Environmental & Infrastructure, Inc.
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
USACE	U.S. Army Corps of Engineers
WRS	Wilcoxon Rank Sum

Executive Summary

A baseline human health risk assessment (BHHRA) addendum was conducted to evaluate risks associated with exposure to surface soil and subsurface soil at the coal yard associated with Ash Pit No. 1, located at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. This coal yard site is referred to as "Coal Yard No. 1." This BHHRA is an addendum to the Ash Pit No. 1 BHHRA. The approach used in the BHHRA addendum is consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions among the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville and Huntington Districts, and Shaw Environmental & Infrastructure, Inc. (a CB&I company).

Site History/Description. The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene, and pentolite. Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the Plum Brook Depot, also known as the Magazine Area, which comprises 2,800 acres. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts from the mid-1950s until 1963.

Accountability and custody for the entire portion of the former PBOW property that had been under the accountability and custody of the Department of the Army were transferred to the National Aeronautics and Space Administration (NASA) on March 15, 1963. NASA performed further decontamination efforts during 1964. NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of the John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status.

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the TNT manufacturing processes. Coal Yard No. 1 was used as a storage area to provide coal for the Powerhouse No. 1 boilers. The coal was brought into the

coal yard via train. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal Yard No. 1 is located immediately to the west of former Powerhouse No. 1. The former coal yard is estimated to have been approximately 350 feet by 210 feet, or approximately 1.7 acres. Half of the former Powerhouse No. 1 building was demolished; the other half was remodeled and is currently being used by NASA as a storage/shop building and power supply hub station. The former coal yard is currently covered with grass and brush vegetation. A thin layer of coal was observed on the ground surface in isolated areas and along the northern perimeter during previous site walks.

Approach. The BHHRA addendum evaluated exposure to chemicals in Coal Yard No. 1 surface soil and subsurface soil. Validated analytical data are from samples collected during 2011, as reported in the site characterization report.

A screening for chemicals of potential concern (COPC) was used to focus the evaluation on those chemicals most likely to present a risk to potentially exposed individuals. This screening included a risk-based screening and, for inorganics, a background screening. The background screening protocol used for Coal Yard No. 1 is based on PBOW Project Delivery Team agreements and differs somewhat from the current Ohio Environmental Protection Agency guidance. Use of this PBOW Project Delivery Team method for the development of background screening concentrations and as part of the COPC screening process ensures consistency between all of the PBOW Formerly Used Defense Sites project sites.

Results/Conclusions. None of the chemicals detected in Coal Yard No. 1 surface soil or subsurface soil were identified as COPCs. The results of the COPC screening indicate that the risks/hazards associated with chemicals detected in Coal Yard No. 1 soils are negligible and/or are related to background soil conditions. Accordingly, a quantitative risk assessment beyond the COPC screening is unnecessary for Coal Yard No. 1 soils.

1.0 Introduction

This baseline human health risk assessment (BHHRA) addendum evaluates potential human health risks associated with exposure to soil at the Powerhouse No. 1 Coal Yard (Coal Yard No. 1), which is located at the former Plum Brook Ordnance Works (PBOW), Sandusky, Erie County, Ohio. This site is administered as part of Defense Environmental Restoration Program (DERP)-Formerly Used Defense Sites (FUDS) Project No. G05OH001821, Ash Pit No. 1 (AP1) and Ash Pit No. 3 (AP3). This work is being conducted by Shaw Environmental & Infrastructure, Inc. (Shaw) (a CB&I company) for the U.S. Army Corps of Engineers (USACE) under the DERP- FUDS program, managed by the USACE Huntington District and technically overseen by the USACE Nashville District. This addendum to AP1 BHHRA (Shaw, 2011a) is consistent with U.S. Environmental Protection Agency (EPA) guidance and with the procedures established in the BHHRA for TNT Area A (TNTA) and TNT Area C (TNTC) soil (IT Corporation [IT], 2001) and, most specifically, the AP1 and AP3 BHHRA work plan (Shaw, 2009).

1.1 Facility Location and Description

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene (DNT), and pentolite (International Consultants Incorporated [ICI], 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNTA, TNT Area B (TNTB), and TNTC. Twelve process lines were used in the manufacture of TNT: four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration (GSA). This transfer did not include the 2,800-acre Plum Brook Depot area, which is also known as the Magazine Area. The Department of the Army reacquired the 3,230 acres in 1954. In 1955, the Army completed further decontamination of the manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds. The Army continued cleanup efforts until 1963.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; then removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were covered with fill material. All materials, including the soil in those areas, were flashed; the area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc., 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of the John H. Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. This excess included former buffer areas that had not been used by the Army and thus were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The GSA retains ownership of the remaining excess acreage and currently has a use agreement

with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the site management plan (ICI, 1995).

1.3 Coal Yard No. 1 Site History

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the TNT manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas to provide coal for the powerhouse boilers. The coal was brought into the yards via train. Figure 1-2 shows the locations of Coal Yard No. 1 and other investigative sites on PBOW property.

Coal Yard No. 1 is located immediately west of Powerhouse No. 1. The former coal yard is estimated to have been approximately 350 feet by 210 feet (approximately 1.7 acres). Half of the Powerhouse No. 1 building was demolished and the other half was remodeled and is currently being used by NASA as a storage/shop building and power supply hub station. The former coal yard is currently covered with grass and brush vegetation. A thin layer of coal was observed on the ground surface in isolated areas and along the northern perimeter during previous site walks.

No previous environmental investigation has been conducted at Coal Yard No. 1.

1.4 Protocol for the Baseline Human Health Risk Assessment

The BHHRA addendum was performed consistent with the AP1 and AP3 BHHRA work plan (Shaw, 2009). The AP1 and AP3 BHHRA work plan was developed consistent with previous PBOW BHHRAs and is based on EPA, USACE, and Ohio Environmental Protection Agency (OEPA) guidance, including, but not limited to, the following:

- OEPA, 2009a, ***Use of U.S. EPA's Regional Screening Levels as Screening Values in Human Health Risk Assessments***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- OEPA, 2009b***, Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for the DERR Remedial Response Program***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- USACE, 1999, ***Risk Assessment Handbook, Volume I: Human Health Evaluation***, Engineer Manual EM 200-1-4.

- EPA, 1989, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

- EPA, 1991, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors***, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

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- EPA, 1997, ***Exposure Factors Handbook***, Office of Research and Development, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.

- EPA, 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

- EPA, 2004a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

2.0 Data Evaluation

Data evaluation consists of a description of the appropriate data sources for Coal Yard No. 1 soil, a discussion of data quality, a description of the methodology used for identification of the chemicals of potential concern (COPC), and a summary of the COPCs.

2.1 Data Sources

All soil samples from which the validated analytical data used in the BHHRA addendum were derived are presented in Table 2-1. The sample summary table identifies each sample used in the BHHRA addendum and the associated analytical suite, which are those collected as part of the remedial investigation in 2011 and described in the Coal Yard No. 1 site characterization report (Shaw, 2012). All Coal Yard No. 1 sampling locations are shown on Figure 2-1.

2.2 Organization of the Analytical Data

Prior to initiation of BHHRA calculations, a database of chemicals present in site soil samples was compiled. This database includes all chemicals detected as described in the site characterization report. The surface soil and subsurface soil are considered separate media. Surface and subsurface soil data are typically combined to assess exposures under the construction worker, future groundskeeper, and hypothetical future residential site-use scenarios, which would likely occur after surface and subsurface soil had been excavated and/or mixed, assuming that COPCs are identified for surface and/or subsurface soil in the BHHRA addendum. Combined surface and subsurface soil data are generally termed “total soil” in the BHHRA. If a chemical is either a surface soil COPC or a subsurface soil COPC (or both), then that chemical is a total soil COPC.

Generally, surface soil is defined as samples collected from within the interval of 0 to 1 foot below ground surface, and subsurface soil is defined as samples collected from depths greater than 1 foot below ground surface per the coal yard sampling and analysis plan (Shaw, 2011b). Coal Yard No. 1 surface soil samples were collected immediately below a layer of fill rock that was used as the base for coal storage; this layer was found to be 0.3 to 1 foot thick. Subsurface soil samples were collected from the 3-to-5-foot and 8-to-10-foot below ground surface intervals.

2.3 Evaluation of Data Quality

The quality of the analytical data was evaluated to select data for inclusion in the BHHRA addendum. Data quality is expressed by the assignment of qualifier codes during the analytical

laboratory quality control process or during third-party data evaluation. Some of the more common qualifiers and their meanings are as follows (EPA, 1989):

U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.

J - Value is estimated, usually below the reporting limit.

N - The analysis indicates an analyte for which there is presumptive evidence to make a tentative identification.

NJ - The analysis indicates a "tentatively identified analyte," and the reported value represents its approximate concentration.

UJ - The analyte was not detected above the reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - Quality control indicates that the data are unusable (chemical may or may not be present).

B - The concentration in the sample is not sufficiently higher than the concentration in the blank, using the 5-times, 10-times rule, which states that a chemical is considered a nondetect unless its concentration exceeds 5 times the blank concentration. For common laboratory contaminants (acetone, 2-butanone [methyl ethyl ketone], methylene chloride, toluene, and the phthalate esters), the sample concentration must exceed 10 times the blank concentration to be considered a detection.

"J," "N," and "NJ" qualified data are treated in the BHHRA addendum as detected concentrations; "R" data and "B" qualified chemical data are not used. "U" qualified data (nondetects) are treated in the BHHRA addendum as nondetections. The use of data with other, less common qualifiers is evaluated on a case-by-case basis. Generally, data for which the identity of the chemical is unclear are not used in the BHHRA. If confidence is reasonably high that the chemical is present but the actual concentration is somewhat in question, the data generally are used in the BHHRA.

Some chemicals may be analyzed under two different analytical programs. For example, the DNT isomers are analyzed by EPA Method 8330 for nitroaromatics as well as EPA Method 8270C for semivolatile organic compounds. As appropriate, risks associated with the reported values from both analyses are typically considered in the risk characterization and discussed as appropriate in the uncertainty analysis, together with potential issues such as the relative

sensitivities (i.e., differences in respective reporting limits) of the methods. The data used in the BHHRA are included as Appendix A.

2.4 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC screening includes a risk-based screen that also considers status as a human nutrient (Section 2.4.1), a frequency-of-detection evaluation (Section 2.4.2), and a background screen (Section 2.4.3).

2.4.1 Risk-Based Screening

In the risk-based screen, the maximum detected concentration (MDC) of a chemical in a given medium is compared to the appropriate risk-based screening concentration (RBSC) for that chemical and medium. This is performed for each chemical in each medium. The units of the MDC and RBSC are the same for each chemical in a given medium. For Coal Yard No. 1, only soil was evaluated; therefore, all MDCs and RBSCs are in units of milligrams per kilogram (mg/kg).

If the MDC of a chemical is less than or equal to its RBSC, then the chemical is not considered further in the BHHRA for this medium because it is very unlikely that chemical concentrations at or below the RBSC would contribute substantially to risk. Where no COPCs for an environmental medium are identified, that medium is not quantitatively evaluated in the BHHRA. An analyte may be identified as a COPC if its MDC exceeds its RBSC. As indicated in Section 2.4, actual status as a COPC also depends on a chemical's frequency of detection (Section 2.4.2), concentration with respect to background (Section 2.4.3), and potential status as a nutrient. RBSCs for both surface and subsurface soil are derived from EPA regional screening level (RSL) "residential soil" values (EPA, 2012a). This is a change in the source of the RBSCs for PBOW BHHRA work plans begun prior to March 2009 based on discussion between USACE and OEPA (2009c), and this change is consistent with current OEPA (2009a) guidelines. Previously, the RBSCs were derived from the EPA (2004b) Region 9 preliminary remediation goals.

RSL values are based on a concentration equal to either an incremental lifetime cancer risk (ILCR) of 1E-6 or a noncancer hazard quotient (HQ) of 1, the threshold at (or below) which adverse noncancer effects are regarded as unlikely to occur. For the BHHRA, the noncancer

values listed in the RSL tables are multiplied by a factor of 0.1 to provide additional protection for simultaneous exposure to multiple chemicals (OEPA, 2009a; EPA, 2012b). This results in RBSC values associated with an HQ of 0.1. For cancer risk, the RSL values based on an ILCR of 1E-6 were used directly as RBSCs in the BHHRA addendum. The National Oil and Hazardous Substances Pollution Contingency Plan identifies acceptable exposure levels that are generally associated with concentration levels that represent an excess upper bound lifetime cancer risk to an individual of 1E-6 to 1E-4 (EPA, 1990). Cancer risks associated with RSL values represent the lower end of this range. OEPA recognizes an overall cancer risk of 1E-5, which represents the logarithmic midpoint of the NCP risk management range, as a remedial goal (OEPA, 2009b). The RBSC for a chemical that elicits both cancer and noncancer health effects is selected based on either a cancer risk of 1E-6 or an HQ of 0.1, whichever associated concentration is lower.

The screening of lead in soil is a special case. Lead exposure and risk are evaluated separately from other chemicals using the EPA (2004c) Integrated Exposure Uptake Biokinetic (IEUBK) model. This IEUBK model includes cumulative lead exposure from multiple media, primarily soil and drinking water exposure. The residential RSL for lead in soil is 400 mg/kg, which is used in the BHHRA as the RBSC. The selection of the action level for lead in drinking water (EPA, 2012c) as the drinking water RSL is based partly on the IEUBK model. Section 5.2 of the RSL user's guide (EPA, 2012b) states that if the average tap water concentration exceeds 15 micrograms per liter (µg/L) and the average soil concentration exceeds 250 mg/kg, then more than the IEUBK target (EPA, 2004c) of 5 percent of the population of exposed children may exceed 10 micrograms per deciliter of lead in blood. It is possible that the residential soil RSL of 400 mg/kg, which is selected as the soil RBSC, may not be protective of an average soil concentration of 250 mg/kg within a given data set. Therefore, the following conditions were placed on the screening of lead: 1) If either the soil RBSC or the drinking water action level for lead is exceeded, then the IEUBK blood-lead model is run using both average soil and groundwater concentrations; and 2) if the average soil concentration exceeds 250 mg/kg, then the IEUBK model is run, even if neither the soil RBSC nor the drinking water action level is exceeded, using average concentrations of lead in both soil and groundwater. Although groundwater is not evaluated specifically in this BHHRA addendum, the average lead concentration in AP1 overburden/shale groundwater (3.8 µg/L) is less than 15 µg/L, and lead was not detected in AP1 bedrock groundwater (Shaw, 2011a).

For Coal Yard No. 1 soil, the MDCs for lead in surface soil (7.6 mg/kg) and subsurface soil (29.8 mg/kg) are both less than the RBSC (400 mg/kg) and the criterion for average concentration (250 mg/kg).

The evaluation of essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required human nutrients. Essential nutrients such as calcium, chloride, iodine, magnesium, phosphorous, potassium, and sodium are generally considered innocuous at levels found in environmental media. No RSLs are listed for these nutrients. Should any of these chemicals be identified as site related, an exposure analysis is performed whereby a daily dose of chemical from ingestion of the medium in question is calculated. The dose is compared with levels known or expected to be safe or toxic and/or with recommended daily allowances, depending on the availability of data.

2.4.2 Frequency of Detection

When confidence is high that a given chemical is present, the data generally are used in the BHHRA. For most chemicals, their detection is presumptive evidence of their presence. As suggested by EPA (1989), chemicals that are reported infrequently may be artifacts in the data that do not reflect the actual presence of the chemical in question. For the BHHRA, chemicals that are reported only at low concentrations in less than 5 percent of the samples from a given medium are excluded from further consideration, unless the presence of a given chemical is expected based on historical information about the site. Chemicals detected infrequently at high concentrations may identify the existence of contaminant plumes or limited “hot spots” and are retained as COPCs.

2.4.3 Comparison to Background

A number of the chemicals detected in PBOW soils may have MDCs that exceed RBSCs but are part of normal background concentrations. Such chemicals may include inorganics and polycyclic aromatic hydrocarbons (PAH), a class of organic compounds that form from natural or anthropogenic combustion of organic matter, including fossil fuels, and are generally ubiquitous in the environment. Airborne PAHs associated with non-U.S. Department of Defense sources may be deposited on soil.

Concentrations of inorganic chemicals in site environmental media may be compared to those of PBOW background using a two-step approach: 1) background screening and 2) statistical data set testing. This second step (Section 2.4.3.2) is initiated only in cases where the concentration used for background screening is exceeded (Section 2.4.3.1) and is performed after the risk characterization. The results of the statistical data testing are discussed in the uncertainty analysis.

Inorganics and organics are treated similarly from a quantitative perspective. However, all organics not eliminated on the basis of RBSC exceedance (Section 2.4.1) or infrequent detection

(Section 2.4.2) are carried through the risk calculation process (exposure assessment, toxicity assessment, and risk characterization). As presented in Section 2.4.3.3, organic compounds are quantitatively eliminated as background related only through the uncertainty analysis if applicable.

2.4.3.1 Background Screening of Inorganics

Background screening is applied to each inorganic that has an MDC in soil exceeding the RBSC and that cannot be characterized as an infrequently detected analyte. In background screening, the MDC is compared to the PBOW chemical-specific background screening concentration (BSC). The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998) (Table 2-2). The background screening protocol used for Coal Yard No. 1 is based on PBOW Project Delivery Team (PDT) agreements (PBOW PDT, 2000), and differs somewhat from the current OEPA (2009d) guidance. Use of this PBOW PDT method for the development of background screening concentrations and as part of the COPC screening process ensures consistency between all of the PBOW FUDS project sites. A summary table of the background soil data set is provided as Table 2-2. The background soil samples were collected from near the property boundary, away from any potential source areas. Briefly, BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (IT, 1998; PBOW PDT, 2000).

The background screening consists of comparing the MDC of the site soil data set to the BSC. The chemical may be regarded as a COPC if its MDC exceeds the BSC for that chemical or if no BSC can be determined due to a lack of detections in the background data set. COPCs are fully evaluated in the exposure assessment, toxicity assessment, and risk characterization. An inorganic analyte is not regarded as a COPC if its MDC is equal to or less than the BSC.

2.4.3.2 Statistical Data Set Testing of Inorganics

Statistical testing is performed to compare site inorganics data against the appropriate PBOW background data sets. The background data set for soil is described in Section 2.4.3.1 and presented in the site investigation for the acid areas (IT, 1998). The method for statistical comparison of the site data sets to the background data sets, described in Appendix M of Shaw (2005), is the Wilcoxon Rank Sum (WRS) statistical test (also known as the Mann-Whitney U test). WRS testing is performed for inorganics having MDCs that exceed the respective BSCs and are identified as COPCs based on RBSC comparison (Section 2.4.1) and frequency of detection (Section 2.4.2). All COPCs are carried through the risk characterization process; thus,

statistical testing results are not used to screen out any chemicals. WRS testing is used only to evaluate inorganic COPCs and is not used to evaluate non-COPC inorganics.

2.4.3.3 Treatment of Organic Compounds

Certain organic compounds (e.g., PAHs) in site media may be attributable to background conditions. However, no organic compounds are summarily screened out. Instead, all detected organic compounds are carried through the risk assessment process (i.e., exposure assessment, toxicity assessment, risk characterization) unless screened out on the basis of comparison to RBSCs (Section 2.4.1) or characterized as infrequently detected (Section 2.4.2). Background contributions of organics are discussed in the uncertainty analysis, as applicable.

2.5 Data Evaluation Summary

Data summary tables are provided for Coal Yard No. 1 surface soil in Table 2-3 and for subsurface soil in Table 2-4. These tables provide the following information for each detected chemical as applicable:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of reporting limits
- Arithmetic mean of site concentrations
- Appropriate BSC
- Appropriate RBSC
- Selection/exclusion of chemical as a COPC
- 95th percent upper confidence limit on the arithmetic mean (for COPCs only)
- Exposure point concentration (for COPCs only).

As shown in Tables 2-3 and 2-4, none of the chemicals detected in Coal Yard No. 1 surface soil or subsurface soil are COPCs. RBSCs are used to screen for human health risks at an ILCR of 1E-6 and an HQ of 0.1. Chemicals with ILCRs and HQs less than these respective levels are identified in the BHHRA work plan (Shaw, 2009) as having insignificant contributions to risk/hazard. This indicates that the cancer risks and noncancer hazards associated with exposure to Coal Yard No. 1 soils are negligible and/or are not greater than those associated with background soils. Therefore, a quantitative risk assessment (exposure assessment, toxicity assessment, and risk characterization [EPA, 1989]) is not necessary and was not performed.

3.0 Summary and Conclusions

3.1 Summary

The BHHRA addendum was conducted to evaluate cancer risk and noncancer hazards associated with Coal Yard No. 1 surface soil and subsurface soil. A COPC identification process, which includes both risk-based screening and background screening components, was performed to identify chemicals detected in Coal Yard No. 1 soil that may contribute appreciably to risk or hazard. The chemicals detected in surface and subsurface soil were screened against the respective residential exposure-based RBSCs, and inorganics in soil were also screened against BSCs. COPCs for the various media are typically identified based on this screening.

3.2 Conclusions

None of the chemicals detected in Coal Yard No. 1 surface soil or subsurface soil were identified as COPCs. The results of the COPC screening indicate that the risks/hazards associated with chemicals detected in Coal Yard No. 1 soils are negligible and/or are related to background soil conditions. Accordingly, a quantitative risk assessment beyond the COPC screening is unnecessary for Coal Yard No. 1 soils.

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TABLES

Table 2-1

Soil Sample Summary
Baseline Human Health Risk Assessment Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Location	Sample Number	Sample Purpose	Sample Date	Depth of Sample (ft bgs)			Analysis
Surface Soil							
CY1-SB01	CY0001	REG	12/20/2011	0.5	-	1.5	Explosives, Metals, PCB, SVOC
CY1-SB02	CY0004	REG	12/20/2011	0.3	-	1.3	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0007	REG	12/20/2011	0.5	-	1.5	Explosives, Metals, PCB, SVOC
CY1-SB04	CY0012	REG	12/20/2011	1	-	2	Explosives, Metals, PCB, SVOC
Subsurface Soil							
CY1-SB01	CY0002	REG	12/20/2011	3	-	5	Explosives, Metals, PCB, SVOC
CY1-SB01	CY0003	REG	12/20/2011	8	-	10	Explosives, Metals, SVOC
CY1-SB02	CY0005	REG	12/20/2011	3	-	5	Explosives, Metals, PCB, SVOC
CY1-SB02	CY0006	REG	12/20/2011	8	-	10	Explosives, Metals, SVOC
CY1-SB03	CY0008	REG	12/20/2011	3	-	5	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0009	FD	12/20/2011	3	-	5	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0011	REG	12/20/2011	8	-	10	Explosives, Metals, SVOC
CY1-SB04	CY0013	REG	12/20/2011	3	-	5	Explosives, Metals, PCB, SVOC
CY1-SB04	CY0014	REG	12/20/2011	8	-	10	Explosives, Metals, SVOC

ft bgs - feet below ground surface
FD - Field duplicate; averaged with regular sample.
PCB - Polychlorinated biphenyls.
REG - Regular sample.
SVOC - Semivolatile organic compounds.

Table 2-2

Background Screening Concentrations of Inorganics in Soil
Baseline Human Health Risk Assessment Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits [a]	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Concentration [c]
Aluminum	12 / 12	3520 - 15500	22.6 - 26.5	L	8.43E+03	2.69E+04	15500
Antimony	9 / 25	5.9 - 9.3	5.4 - 8.0	NP	4.68E+00	NA	9.30
Arsenic	23 / 26	2.1 - 36.5	1.1 - 24.7	L	1.08E+01	7.10E+01	36.5
Barium	9 / 12	35.6 - 826	22.6 - 26.5	L	1.16E+02	1.30E+03	826
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	566 - 663	L	1.13E+04	2.18E+05	52300
Chromium	25 / 26	4.4 - 29	1.1 - 12.3	NP	1.34E+01	NA	29.0
Cobalt	9 / 12	9.6 - 116	5.7 - 61.7	L	2.26E+01	2.48E+02	116
Copper	23 / 26	2.3 - 56.2	2.2 - 3.3	L	1.70E+01	1.47E+02	56.2
Iron	12 / 12	5880 - 234000	11.3 - 123	L	4.01E+04	3.58E+05	234000
Lead	26 / 26	1.9 - 48.6	0.34 - 7.4	L	1.28E+01	5.13E+01	48.6
Magnesium	12 / 12	629 - 10400	566 - 663	L	3.26E+03	3.08E+04	10400
Manganese	26 / 26	21 - 13300	1.7 - 18.5	L	7.29E+02	3.51E+03	3506
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	0.085
Nickel	26 / 26	5.4 - 55.1	4.5 - 5.3	L	2.28E+01	7.79E+01	55.1
Potassium	11 / 12	579 - 3390	566 - 663	L	1.24E+03	6.08E+03	3390
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	11.1
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30
Vanadium	11 / 12	9 - 40.9	5.7 - 61.7	L	2.48E+01	8.31E+01	40.9
Zinc	26 / 26	6.6 - 655	0.57 - 12.3	L	7.30E+01	3.22E+02	322

L - Lognormal; mg/kg - milligrams per kilogram; NP - nonparametric; NA - not applicable; not available.

[a] A single background sample had to be diluted such that the reporting limits of this sample (BCG-SB01, 6990) were elevated 10 or 20 times higher than they would have been if not diluted. This affects the maximum reporting limit shown for arsenic, chromium, cobalt, iron, lead, manganese, and vanadium. Reporting limits for these analytes in all other samples were much lower, approximately by an order of magnitude or more in each case.

[b] 95% UTL - 95% upper tolerance limit calculated as described in IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.

[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used. This approach was agreed upon for all future risk assessments by the Plum Brook Ordnance Works Project Delivery Team (PDT) during the May 10, 2000 PDT meeting.

Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Source: IT, 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment* , Final, Former Plum Brook Ordnance Works, Sandusky, Ohio,November, and reports referenced therein, including IT (1998).

Table 2-3

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil
Baseline Human Health Risk Assessment Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg										
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]		
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg		COPC? [c,d]
Inorganics													
Aluminum	4 / 4	100	2.03E+03		5.48E+03		8.20E-01	1.40E+00	4.30E+03	1.55E+04	7700		N (b)
Antimony	3 / 4	75	1.20E-01	J	1.70E-01	J	4.10E-02	6.80E-02	1.23E-01	9.30E+00	3.1		N (b)
Arsenic	4 / 4	100	3.10E+00		3.46E+01		4.10E-02	6.80E-02	1.78E+01	3.65E+01	0.39		N (b)
Barium	4 / 4	100	1.85E+01		4.65E+01		4.10E-02	6.80E-02	3.01E+01	8.26E+02	1500		N (b)
Beryllium	4 / 4	100	6.10E-02	J	3.20E-01		4.10E-03	6.80E-03	2.20E-01	1.00E+00	16		N (b)
Cadmium	2 / 4	50	1.70E-01	J	8.00E-01		4.10E-03	6.80E-03	2.45E-01	NA	7		N (b)
Calcium	4 / 4	100	4.47E+02		2.34E+03		2.00E+00	3.40E+00	1.15E+03	5.23E+04	Nutrient		N (c)
Chromium	4 / 4	100	3.90E+00		1.30E+01		4.10E-02	6.80E-02	8.35E+00	2.90E+01	0.29		N (b)
Cobalt	4 / 4	100	7.90E-01	J	3.30E+00	J	4.10E-02	6.80E-02	2.62E+00	1.16E+02	2.3		N (b)
Copper	4 / 4	100	3.30E+00		1.20E+01		4.10E-02	6.80E-02	7.20E+00	5.62E+01	310		N (b)
Iron	4 / 4	100	7.84E+03		3.17E+04		1.40E+00	2.30E+00	1.51E+04	2.34E+05	5500		N (b)
Lead	4 / 4	100	4.80E+00		7.60E+00		4.10E-02	6.80E-02	6.28E+00	4.86E+01	400		N (b)
Magnesium	4 / 4	100	2.74E+02		1.09E+03		2.00E+00	3.40E+00	6.82E+02	1.04E+04	Nutrient		N (c)
Manganese	4 / 4	100	2.37E+01		1.48E+02		4.10E-02	6.80E-02	7.40E+01	3.51E+03	180		N (b)
Mercury	4 / 4	100	1.30E-02	J	4.90E-02	J	6.60E-03	7.00E-03	2.95E-02	8.50E-02	2.3		N (b)
Nickel	4 / 4	100	2.30E+00		9.80E+00		4.10E-02	6.80E-02	7.33E+00	5.51E+01	150		N (b)
Potassium	4 / 4	100	2.02E+02	J	7.16E+02		2.00E+00	3.40E+00	3.83E+02	3.39E+03	Nutrient		N (c)
Silver	1 / 4	25	7.40E-02	J	7.40E-02	J	4.10E-02	6.80E-02	5.70E-02	1.11E+01	39		N (b)
Sodium	3 / 4	75	8.95E+01	J	1.11E+02	J	3.10E+01	5.10E+01	8.79E+01	NA	Nutrient		N (c)
Thallium	1 / 4	25	6.40E-01	J	6.40E-01	J	4.10E-02	6.80E-02	1.99E-01	1.30E+00	0.078		N (b)
Vanadium	4 / 4	100	8.00E+00		2.28E+01		4.10E-02	6.80E-02	1.57E+01	4.09E+01	39		N (b)
Zinc	4 / 4	100	9.40E+00		2.79E+01		4.10E-02	6.80E-02	1.99E+01	3.22E+02	2300		N (b)
Semivolatile Organic Compounds													
Fluoranthene	1 / 4	25	3.13E-02	J	3.13E-02	J	2.00E-02	2.30E-02	2.28E-02		230		N (a)
Methylnaphthalene, 2-	2 / 4	50	2.64E-02	J	3.34E-02	J	2.00E-02	2.30E-02	2.50E-02		23		N (a)
Naphthalene	1 / 4	25	1.83E-01	J	1.83E-01	J	3.20E-02	3.70E-02	6.98E-02		3.6		N (a)
Phenanthrene	1 / 4	25	2.55E-02	J	2.55E-02	J	2.00E-02	2.30E-02	2.14E-02		170	e	N (a)
Pyrene	1 / 4	25	3.09E-02	J	3.09E-02	J	2.00E-02	2.30E-02	2.27E-02		170		N (a)

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
VQ - Validation qualifier.

[a] Value is either the 95th percent upper tolerance limit or the maximum detcted value of the background data set, whichever is less. Source: IT Corporation (IT), 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment* , Final, Former Plum Brook Ordnance Works, November, and reports

[b] Risk-Based Screening Concentrations based on USEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration is less than the RBSC.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.

[d] Y = Chemical is chosen as COPC.

[e] RBSC based on acenapthene.

Table 2-4

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil
Baseline Human Health Risk Assessment Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Reporting Limits		Mean	BSC [a]	RBSC [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	6.02E+03		1.23E+04		9.50E-01	5.30E+00	9.18E+03	1.55E+04	7700	N (b)
Antimony	3 / 8	38	1.30E-01	J	2.30E-01	J	5.00E-02	2.70E-01	1.61E-01	9.30E+00	3.1	N (b)
Arsenic	8 / 8	100	3.80E+00		1.13E+01		4.70E-02	2.70E-01	7.63E+00	3.65E+01	0.39	N (b)
Barium	8 / 8	100	4.25E+01		8.22E+01		4.70E-02	2.70E-01	6.17E+01	8.26E+02	1500	N (b)
Beryllium	8 / 8	100	3.60E-01		6.50E-01		4.70E-03	2.70E-02	5.10E-01	1.00E+00	16	N (b)
Cadmium	7 / 8	88	1.50E-01	J	6.50E-01		5.00E-03	2.70E-02	3.82E-01	NA	7	N (a)
Calcium	8 / 8	100	3.01E+03		5.00E+04		2.50E+00	1.30E+01	1.57E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	1.07E+01		1.90E+01		5.00E-02	2.70E-01	1.46E+01	2.90E+01	0.29	N (b)
Cobalt	8 / 8	100	6.40E+00		1.80E+01		4.70E-02	2.70E-01	1.09E+01	1.16E+02	2.3	N (b)
Copper	8 / 8	100	1.76E+01		2.58E+01		4.70E-02	2.70E-01	2.04E+01	5.62E+01	310	N (b)
Iron	8 / 8	100	1.32E+04		2.34E+04		1.60E+00	9.00E+00	1.83E+04	2.34E+05	5500	N (b)
Lead	8 / 8	100	1.03E+01		2.98E+01		4.90E-02	1.90E-01	1.38E+01	4.86E+01	400	N (b)
Magnesium	8 / 8	100	1.18E+03		1.25E+04		2.40E+00	1.30E+01	5.59E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.88E+02		7.21E+02		4.70E-02	2.70E-01	3.40E+02	3.51E+03	180	N (b)
Mercury	8 / 8	100	1.50E-02	J	7.60E-02	J	6.90E-03	7.40E-03	2.83E-02	8.50E-02	2.3	N (b)
Nickel	8 / 8	100	1.36E+01		3.81E+01		4.70E-02	2.70E-01	2.59E+01	5.51E+01	150	N (b)
Potassium	8 / 8	100	4.35E+02	J	1.55E+03		2.40E+00	1.30E+01	1.10E+03	3.39E+03	Nutrient	N (c)
Selenium	1 / 8	13	5.30E-01	J	5.30E-01	J	1.00E-01	5.30E-01	2.74E-01	2.00E+00	39	N (b)
Sodium	3 / 8	38	9.23E+01	J	1.15E+02	J	3.60E+01	2.00E+02	9.76E+01	NA	Nutrient	N (c)
Thallium	3 / 8	38	2.34E-01	J	3.80E-01	J	4.90E-02	1.90E-01	1.64E-01	1.30E+00	0.078	N (b)
Vanadium	8 / 8	100	1.43E+01		2.61E+01		4.70E-02	2.70E-01	1.95E+01	4.09E+01	39	N (b)
Zinc	8 / 8	100	3.75E+01		1.63E+02		5.00E-02	2.70E-01	7.68E+01	3.22E+02	2300	N (b)
Semivolatile Organic Compounds												
Dibenzofuran	1 / 8	13	1.03E-01	J	1.03E-01	J	2.00E-02	8.40E-02	3.13E-02		7.8	N (a)
Fluoranthene	1 / 8	13	1.38E-01	J	1.38E-01	J	2.00E-02	8.40E-02	3.56E-02		230	N (a)
Fluorene	1 / 8	13	1.05E-01	J	1.05E-01	J	2.00E-02	8.40E-02	3.15E-02		230	N (a)
Pyrene	1 / 8	13	1.24E-01	J	1.24E-01	J	2.00E-02	8.40E-02	3.39E-02		170	N (a)

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
VQ - Validation qualifier.

[a] Value is either the 95th percent upper tolerance limit or the maximum detcted value of the background data set, whichever is less. Source: IT Corporation (IT), 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment* , Final, Former Plum Brook Ordnance Works, November, and reports referenced therein.
[b] Risk-Based Screening Concentrations based on USEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = maximum detected concentration is less than the RBSC.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPC.

FIGURES

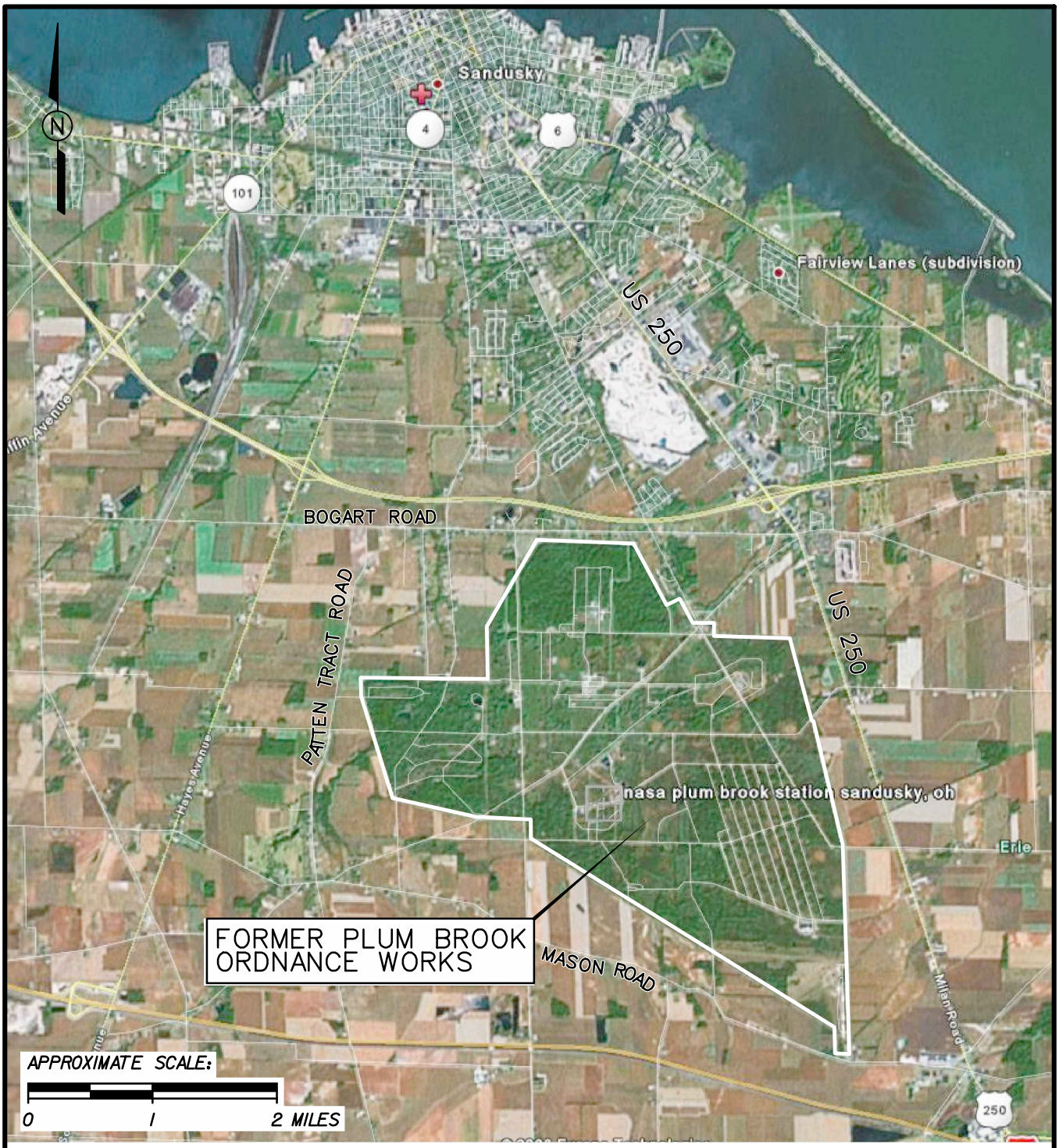

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT No. 1 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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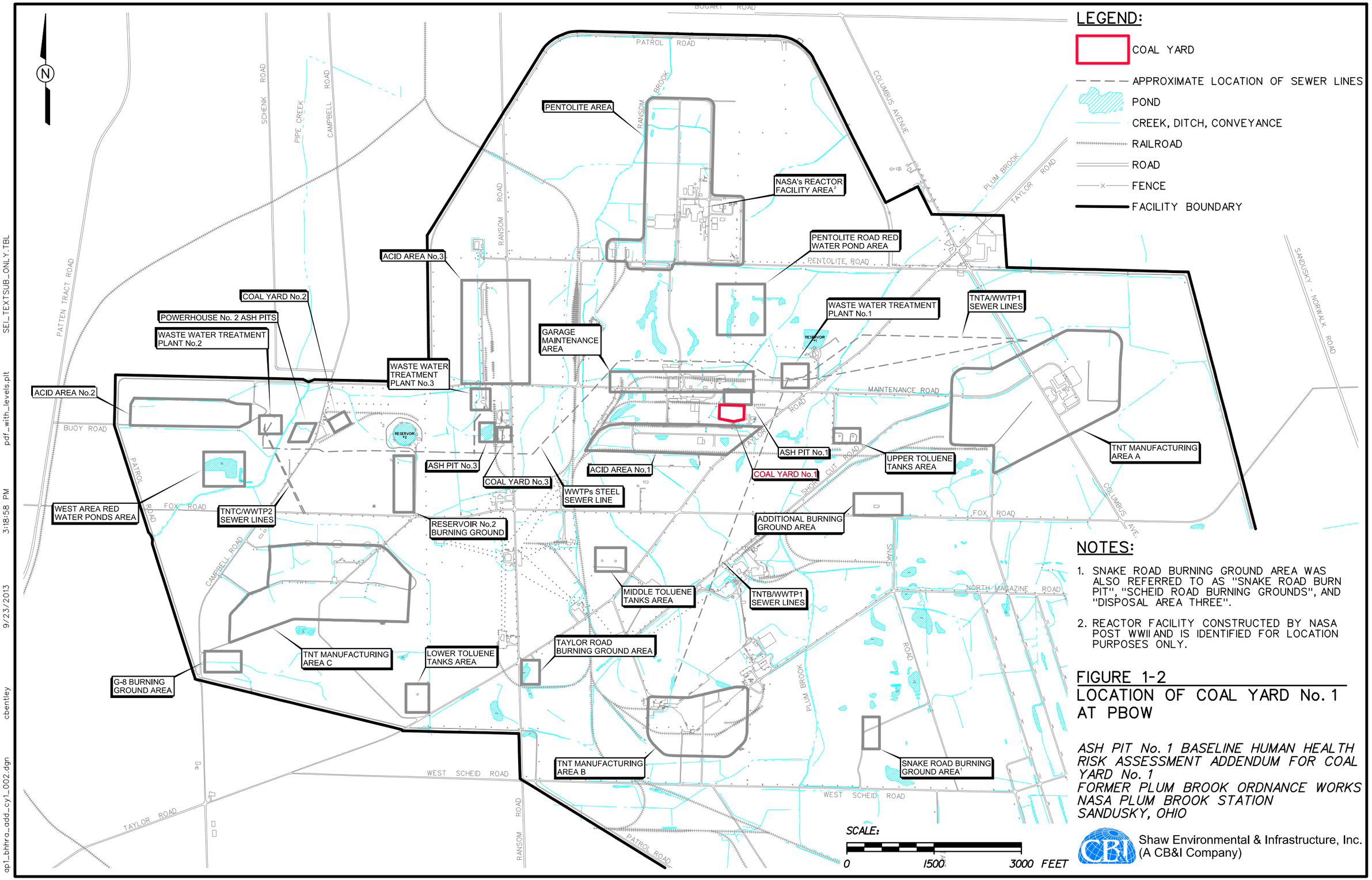

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

FIGURE 1-2
LOCATION OF COAL YARD No. 1 AT PBOW

ASH PIT No. 1 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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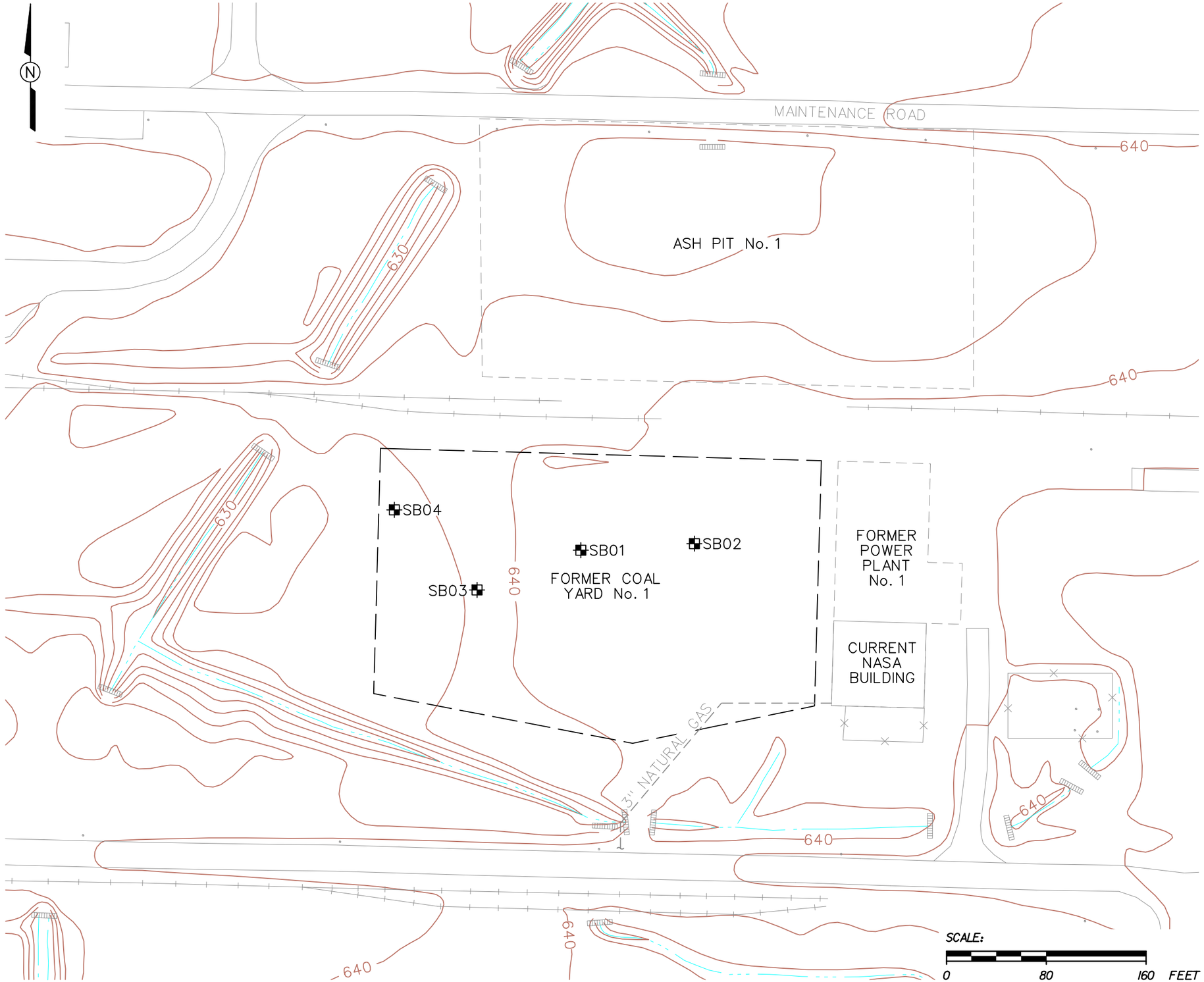

LEGEND:

- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES
- APPROXIMATE HISTORICAL COAL STORAGE PERIMETER BASED ON AERIAL PHOTO
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTEVAL)

FIGURE 2-1
SAMPLE LOCATIONS AT COAL YARD No. 1

ASH PIT No. 1 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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RESPONSE TO COMMENTS

Responses to Ohio Environmental Protection Agency Comments on the Draft Baseline Human Health Risk Assessment and Screening-Level Ecological Risk Assessment for Ash Pit No. 1 Addendum for Coal Yard No. 1 Former Plum Brook Ordnance Works, Sandusky, Ohio, Dated May 7, 2013

Comments by Janusz Byczkowski, Risk Assessor, Ohio Environmental Protection Agency, received June 27, 2013.

BHHRA Comments

Comment 1: **Section ES-1, Line 6. The BHHRA document states:** ***"…consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions and agreements between the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville…"***

The issue of determining background and the "agreement" was already discussed in previous reviews. Please note that no legally binding agreement has been made between OEPA and ACE or Shaw Environmental Inc., regarding risk assessment methodology at the NASA Plum Brook Site. Please delete reference to "agreements" with Ohio Environmental Protection Agency.

Response 1: The words "and agreements" will be removed from the indicated text.

BHHRA and SLERA Comments

Comment 2: **BHHRA Section 2.2, P. 2-1, L#22, Tabl. 2-3 and SLERA Section 2.2.1, P. 2-3, L#25, Tabl 2-2. The BHHRA document states: *"…surface soil is defined as samples collected within the interval of 0 to 1 foot below ground surface…"*. The SLERA document states *"…For ecological impact, soil from 0 to 6 feet below ground surface (bgs) was used…"*. Yet in both, BHHRA Table 2-3 and SLERA Table 2-2, concentrations are listed as "in Surface Soil".**

Using different intervals bgs under the same term "Surface Soil" may be confusing and deserves an explanation at the footnote of each table presenting the soil data. The exact depth of samples is further complicated by statement in BHHRA page 2-1: *"…surface soil samples were collected immediately below a layer of fill rock that was used as the base for coal storage; this layer was found to be 0.3 to 1 foot thick…"*

Response 2: The title of Table 2-2 in the SLERA will be changed to "*Statistical Summary and Selection of Chemicals of Potential Concern in ~~Surface Soil~~ Soil (0 to 6 feet bgs)*".

APPENDIX F

ASH PIT NO. 1 SLERA ADDENDUM FOR COAL YARD NO. 1

Shaw Environmental
& Infrastructure, Inc.

Final
October 2013

Ash Pit No. 1
Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 1
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

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October 23, 2013

U.S. Army Engineer District, Nashville
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Nashville, Tennessee 37203

Subject: ***Submittal of the Final Ash Pit No. 1 Baseline Human Health Risk Assessment and Screening-Level Ecological Risk Assessment Addenda for Coal Yard No. 1 Former Plum Brook Ordnance Works, Sandusky, Ohio Contract No. W912QR-08-D-0013: Shaw Project Number 132457***

Dear Ms. Coleman:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 awarded to Shaw Environmental & Infrastructure, Inc., a CB&I company, we are pleased to submit the Final Addenda to the Ash Pit No.1 (AP1) Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment for Coal Yard No. 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report was prepared consistent with other PBOW risk assessment reports, U.S. Environmental Protection Agency guidance, and the AP1 risk assessment work plan.

Enclosed for your records are four copies of this report. Copies have also been sent to those on the distribution list as indicated for their records. As requested, the document was sent to the Center of Expertise (CX) and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven. T. Downey, PE, PMP
Project Manager

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Shaw Environmental & Infrastructure, Inc.

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No.1 SLERA Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 45000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
☐	Report		**Document Status**
X	Risk Assessment / Evaluation	SLERA Addendum	☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 1
Screening-Level Ecological Risk Assessment Addendum
for Coal Yard No. 1
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works,
Sandusky, Ohio

Prepared for:

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October 2013

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List of Acronyms

AP1	Ash Pit No. 1
bgs	below ground surface
BSC	background screening concentration
COPEC	chemical of potential ecological concern
EPA	U.S. Environmental Protection Agency
ESV	ecological screening value
IT	IT Corporation
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
NASA	National Aeronautics and Space Administration
NWI	National Wetlands Inventory
OEPA	Ohio Environmental Protection Agency
PBOW	Plum Brook Ordnance Works
Shaw	Shaw Environmental & Infrastructure, Inc.
SLERA	screening-level ecological risk assessment
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers

Executive Summary

A screening-level ecological risk assessment (SLERA) was performed to provide an estimate of current and future ecological hazard associated with potential hazardous substance releases within the Ash Pit No. 1 (AP1) Coal Yard (Coal Yard No. 1) site at Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio. Coal Yard No. 1 is associated with AP1 at PBOW, and this SLERA is an addendum to the AP1 SLERA. The results of the SLERA contribute to the overall characterization of the site and serve as part of the baseline used to develop, evaluate, and select appropriate remedial alternatives, if necessary. The objective of the SLERA is to present information for risk managers regarding the potential for adverse impacts to occur to ecological receptors as a result of site-related releases. Although the term "ecological risk assessment" is commonly used in guidance documents and available technical literature, it should be noted that ecological "risk" is not calculated in the SLERA, as no statistical probabilities of toxicological effects are generated in the SLERA. The assessment addresses the potential for adverse effects to the vegetation, wildlife, aquatic life, and endangered and threatened species. The small size of the site likely reduces any potential hazard to populations of ecological receptors to negligible levels, even if contamination were found to be present. However, to meet project team goals and agreements, SLERAs are performed at all individual sites at PBOW.

The maximum detected concentrations of chemicals in soil were compared with risk-based screening ecotoxicity values during an initial screening step. Chemicals that exceeded the screening values (or for which no screening values were available) and that did not meet additional screening criteria (e.g., comparison with background data, nutrient status, frequency of detection, etc.) were retained as chemicals of potential ecological concern (COPEC) and assessed further. The background screening protocol used for the PBOW sites is based on PBOW Project Delivery Team agreements and differs somewhat from the current Ohio Environmental Protection Agency guidance. Use of this PBOW Project Delivery Team method for the development of background screening concentrations and as part of the COPEC screening process ensures consistency between all of the PBOW Formerly Used Defense Sites project sites.

Cadmium and dibenzofuran were the only two chemicals identified as COPECs following the initial screening step. Cadmium was only detected in three samples at concentrations that marginally exceeded its conservative ecological screening value. The presence of cadmium may be background-related; a concentration gradient indicative of a release was not observed in the data set, and background data for this chemical that would allow a comparison of Coal Yard No. 1 concentrations to naturally occurring concentrations were not available. Dibenzofuran was

detected in a single soil sample at an estimated concentration and was identified as a COPEC due to its lack of a screening value. Because of the low concentrations detected and very limited spatial area potentially affected, neither chemical is expected to be relevant to ecological exposure at the site, and the SLERA for the Coal Yard No. 1 concluded after the COPEC selection stage.

Based on the findings of the SLERA, the potential for adverse effects to populations of ecological receptors exposed to chemicals in soil at the Coal Yard No. 1 is expected to be negligible.

1.0 Introduction

This screening-level ecological risk assessment (SLERA) addendum evaluates the potential for adverse effects posed to ecological receptors from potential releases at the Ash Pit No. 1 (AP1) Coal Yard (Coal Yard No. 1) at the former Plum Brook Ordnance Works (PBOW). Coal Yard No.1 is associated with AP1 at PBOW both spatially and due to shared historical operations; thus, this SLERA is performed as an addendum to the AP1 SLERA, which was submitted as a final report in August 2011 (Shaw Environmental & Infrastructure [Shaw] [a CB&I company], 2011). This addendum evaluates additional soil samples that were collected from the adjacent Coal Yard No. 1 in 2011. The approaches used to evaluate the potential for ecological risk are the same as those described in the AP1 SLERA work plan (Shaw, 2009). This SLERA is consistent with the ecological risk assessment process described in U.S. Environmental Protection Agency (EPA) guidance (e.g., EPA [1997]), with Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response guidance (OEPA, 2008), and with the procedures established in previous ecological risk assessments performed at PBOW (e.g., IT Corporation [IT], 2001; Shaw, 2010a), with some adjustments to accommodate current practices in the field of ecological risk assessment. It is noted that the small size of the site likely reduces any potential hazard to populations of ecological receptors to negligible levels, even if contamination were found to be present. However, to meet project team goals and agreements, SLERAs are performed at all individual sites at PBOW.

This work is being conducted by Shaw for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites and managed by the USACE Huntington District, with technical oversight provided by the USACE Nashville District.

1.1 Facility Description and Location

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene, and pentolite (USACE, 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNT Area A (TNTA), TNT Area B (TNTB), and TNT Area C (TNTC). Twelve process lines were used in the manufacture of TNT, including four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the War Department in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After decontamination, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration after being certified by the U.S. Army to be decontaminated. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the 2,800 acres comprising the Plum Brook Depot area, also known as the Magazine Area. The Department of the Army reacquired the 3,230 acres in 1954 and performed remedial efforts from the mid-1950s until 1963. In 1955, the Army completed further decontamination of manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; and removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were likewise buried. All materials, including the soil in those areas, were flashed. The area was then rough-graded. The

decontamination process was also to have included the burning of nitroaromatic-filled flumes that were excavated (Dames and Moore, Inc., 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the facility are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The General Services Administration retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the site management plan (USACE, 1995).

1.3 Coal Yard No. 1 Description and History

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the acid, 2,4,6-TNT, dinitrotoluene, and pentolite manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. As mentioned previously, the coal yards were used as storage areas providing coal to be used in the powerhouse's boilers. The coal was brought into the yards via train. Figure 1-2 shows the locations of the three coal yards on PBOW property.

Former Coal Yard No. 1 is located immediately to the west of Powerhouse No. 1. The historical former coal yard is estimated to have been approximately 350 feet wide by 210 feet in length (approximately 1.7 acres). Half of the Powerhouse No. 1 building was demolished and the other half was remodeled and is currently being used as a storage/shop building and power supply hub station by NASA. The former coal yard is currently covered with grass and brush vegetation. A thin layer of coal was observed on the ground surface in isolated areas and along the northern perimeter during previous site walks. No permanent or semipermanent water bodies are present at this site; therefore, soil is the only medium evaluated in the SLERA.

1.4 Scope and Objectives

The objective of this SLERA is to provide an estimate of the potential for adverse ecological effects associated with contamination resulting from former PBOW activities at Coal Yard No. 1. The results of the SLERA will contribute to the overall characterization of the site and may be used to determine the need for additional investigations or to develop, evaluate, and select appropriate remedial alternatives. Guidance documents used to perform the SLERA include the general guidelines of the *Tri-Service Procedural Guidelines for Ecological Risk Assessments* (Wentsel et al., 1996), as well as the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1997), *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Guidance Bulletin No. 1* (EPA, 1996), and *Guidance for Conducting Ecological Risk Assessments* (OEPA, 2008). The SLERA fits into Steps 1 and 2 of the ecological risk assessment guidance for Superfund process (EPA, 1997), and Level I through a maximum of Level III evaluation using the OEPA (2008) process.

The goal of the SLERA is to evaluate the potential for adverse ecological effects to ecological receptors from site-related contaminants at Coal Yard No. 1. This objective is met by characterizing the ecological communities in the vicinity of the site, determining the particular contaminants present, identifying pathways for receptor exposure, and estimating the potential for adverse effects to identified receptors. The SLERA addresses the potential for adverse effects to the vegetation, wildlife, aquatic life (e.g., sediment-dwelling organisms), threatened and endangered species, and wetlands or other sensitive habitats associated with the site.

The SLERA evaluates the chemicals of potential ecological concern (COPEC), the ecosystems and receptors at risk, the ecotoxicity of the contaminants known or suspected to be present, and observed or anticipated ecological effects. This evaluation is conducted in two steps: (1) a screening assessment step, which is described in Chapter 2.0 as part of the problem formulation; and (2) a predictive assessment step. Ecological endpoints to be addressed in both steps are identified. The results and conclusions of the screening assessment determine whether a predictive assessment is needed. The criteria by which the need for a predictive assessment is measured are formalized as null hypotheses to be accepted (in which case a predictive assessment is not needed) or rejected (in which case a predictive assessment is needed). The predictive assessment includes the exposure characterization, ecological effects characterization, and risk characterization. Because of the lack of contamination detected at the site, the SLERA process was terminated after the initial screening assessment step during the problem formulation stage, and the predictive assessment was not performed.

2.0 Problem Formulation

The screening assessment null hypotheses are stated as follows:

- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of viable habitat for potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential exposure pathways.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential chemical stressors.

If one or more of these null hypotheses are accepted, a predictive assessment is not triggered. All four null hypotheses must be rejected for a predictive assessment to be triggered. The first three null hypotheses are tested with the results of the ecological site description, the pre-assessment reconnaissance, the documentation of potential receptors of special concern and critical habitats, and the determination of significant ecological threats (Section 2.1). The fourth null hypothesis is tested with the results of COPEC selection (Section 2.2).

If a predictive assessment is triggered, terrestrial ecological conceptual site models are developed, as appropriate, and additional problem formulation tasks are performed.

2.1 Ecological Site Description

This ecological site description includes a general discussion of site background and the area of concern, surface water resources (if any), wetlands, and vegetative communities; a species inventory; and a discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities.

Because Coal Yard No. 1 is in such close proximity to AP1, a formal ecological reconnaissance was not performed for Coal Yard No. 1. Rather, the habitat description, sensitive ecological resources, and faunal assemblages (including potential threatened and endangered species) described in the AP1 SLERA (Shaw, 2011) were determined to also be relevant for the Coal Yard No. 1 site. Also, a trained ecologist visited Coal Yard No. 1 in September 2011 to make

general observations of site conditions. Photographs taken during this visit are presented on Figure 2-1.

General Site Background. PBOW, approximately 6,400 acres in size, is located within the Eastern Lake Plains physiographic region of the Eastern Huron/Erie Lake Plain Ecoregion (Lafferty, 1979; Omernik, 1986). This region is generally characterized as containing flat plains as the predominant land surface form and having a dominant natural vegetation of elm and ash in undisturbed areas. Approximately two-thirds of Erie County was once covered by a glacial lake that produced features such as beach ridges and wave-cut cliffs. Much of the region is poorly drained due to the flat topography and low stream gradients. Many of the wetlands adjacent to Lake Erie in this region have been preserved by various federal, state, and private organizations (Peterjohn and Rice, 1991), thereby providing important wetland habitat for wildlife.

Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. Elevations range from 675 feet above mean sea level at the southwest edge of the site to 625 feet above mean sea level in the northern portion of the property at Bogart Road, resulting in an average slope of approximately 0.3 percent. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (Ohio Department of Natural Resources, 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second-generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within a sea of agricultural and residential land in north-central Ohio.

As noted in Section 1.3, Coal Yard No. 1 is located immediately adjacent to Powerhouse No. 1. Figure 1-2 shows the specific site location and general site features. Descriptions and information regarding the local geography, topography, surface drainage, regional and local geology and hydrogeology characteristics, and precipitation influence effects on local water levels have been prepared and included in the final Ash Pit 1 Site Characterization Report (Shaw, 2010b). Descriptions of the ecological resources in the vicinity of the Coal Yard No. 1, including common flora and fauna species in the area, threatened or endangered species, and local habitats, are included in the AP1 SLERA (Shaw, 2011).

The Coal Yard No. 1 area is primarily covered by herbaceous and shrubby vegetation, with early successional forest present near the perimeter of the site (see Photos 1 through 3, Figure 2-1). Small pieces of coal were observed in the soil (see Photo 4, Figure 2-1). The former Coal Yard No. 1 area has minimal relief, and no water bodies are present at the site.

According to the National Wetland Inventory (NWI) maps for the area (U.S. Fish and Wildlife Service, 2013), there are no designated wetlands at the Coal Yard No. 1 site. It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes such as PBOW, because minor depressions often contain isolated wetlands not easily identified through aerial photograph interpretation (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). NASA is currently performing a wetland delineation study at PBOW. This delineation effort was not complete at the time of this SLERA's submittal. The delineation effort will better identify locations and extent of sensitive wetland habitat throughout the installation.

2.2 Selection of Chemicals of Potential Ecological Concern

A list of the Coal Yard No. 1 soil samples used for the SLERA is presented in Table 2-1. Sample locations are presented on Figure 2-2. From the chemical results of samples listed in Table 2-1, a COPEC selection process was performed to develop a subset of chemicals detected at the site that are potentially site-related. Selected COPECs are also present at sufficient frequencies, concentrations, and spatial areas to pose a potential risk to ecological receptors. Examples of screening criteria that were used include the following: analytical detection limit, frequency of detection less than 5 percent, comparability with background, status as a nutrient, and comparison with risk-based screening ecotoxicity values. The COPEC selection process is described in more detail in Section 2.2.3.

2.2.1 Data Organization

Chemical analytical data were reviewed and evaluated for quality, usefulness, and uncertainty. Data identified as being of acceptable quality for use in the SLERA were summarized in a manner that presents the pertinent information to be applied in the SLERA. Any data rejected during the data evaluation as a result of the data evaluation ("R"-qualified data) were identified along with the rejection rationale. All data used in the SLERA were validated.

For ecological impacts, soil from 0 to 6 feet below ground surface (bgs) was used. The 0 to 6 feet depth interval was selected for three primary reasons: (1) to maintain consistency with other PBOW ecological risk assessments (e.g., IT [2001]), (2) to include potential exposure to ecological receptors that may be exposed to deeper soil, and (3) to increase the size of the total soil database by including samples collected from up to 6 feet bgs. The data used for the SLERA are presented in Appendix A.

Chemicals not detected at least once in soil were not included in the risk assessment. Available background data were determined for soil. Potential sources of background information include

data from previous and current investigations as well as monitoring wells in areas unaffected by site activities.

The analytical data included qualifiers from the analytical laboratory quality control or from the data validation process that reflect the level of confidence in the data. Some of the data qualifiers reported in the data evaluated for this SLERA and their meanings are as follows (EPA, 1989):

- U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.
- J - Value is estimated, concentration reported above the method detection limit and below the contract-required quantitation limit.
- R - Quality control indicates that the data are unusable (chemical may or may not be present).
- B - Concentration of chemical in the sample is not sufficiently higher than concentration in the blank. If the concentration in the sample is less than 5 times the blank concentration or less than 10 times the concentration of a common laboratory contaminant, the result is given a B-qualifier and is not used in the risk assessment. Common laboratory contaminants include acetone, 2-butanone, methylene chloride, toluene, and phthalate esters (EPA, 1989).

"J"-qualified data are used in the risk assessment; "R"- and "B"-qualified data are not. The handling of "U"-qualified data (nondetects) is described in the following sections.

2.2.2 Descriptive Statistical Calculations

Because of the uncertainty associated with characterizing contamination in environmental media, both the mean and the 95 percent upper confidence limit (UCL) of the mean are usually estimated for COPECs. As described in Section 2.2.4, 95 percent UCLs were not calculated for Coal Yard No. 1. The means of detected chemicals are presented in Table 2-2, however, and these values were calculated using the method detection limit as a surrogate concentration for nondetect results.

Analytical data from field duplicates were joined with parent sample results to yield one result for use in the generation of mean concentrations, as follows:

- The average of field duplicate and parent sample was used if both were positive detections or if both were nondetects.
- The detected value was used if one sample was a positive detection and the other was a nondetect.

2.2.3 COPEC Selection Criteria

The criteria used to identify COPECs in the SLERA are described in Sections 2.2.3.1 through 2.2.3.4.

2.2.3.1 Comparison to Ecological Screening Values

Maximum detected concentrations (MDC) of chemicals detected in soil were compared with ecological screening values (ESV) for ecological endpoints following recommendations received from OEPA and as discussed in EPA *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Guidance Bulletin No. 1* (EPA, 1996). Chemicals that exceed the ESVs, or for which no ESVs are available, were retained as COPECs if other COPEC selection criteria were also met. The following ESVs, or ESV hierarchy (as noted), were used for the ecological evaluation:

- ***Soil.*** Soil screening values were selected using the following hierarchy: (1) EPA ecological soil screening levels (EPA, 2008), (2) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson et al., 1997a), (3) EPA Region 5 ecological screening levels (EPA, 2003), (4) *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process* (Efroymson et al., 1997b), and (5) *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants* (Efroymson et al., 1997c). It should be noted that effects on heterotrophic processes may not be relevant to ecological receptors of concern at the site.

The development of the ESVs used for the former PBOW SLERAs is presented in Appendix B.

2.2.3.2 Frequency of Detection

Chemicals that are detected infrequently may be artifacts in the data that may not reflect site-related activity or disposal practices. These chemicals are not evaluated further in the risk assessment. Generally, chemicals that are detected only at low concentrations in 5 percent or less of the samples from a given medium (if at least 20 samples are analyzed) are dropped from further consideration unless their presence is expected based on historical information about the site. Because fewer than 20 soil samples were collected for Coal Yard No. 1 soil, this screening criterion was not used in the SLERA.

2.2.3.3 Background Evaluation

Chemical concentrations were compared to site-specific background concentrations (see next paragraph for details) as an indication of whether a chemical is present from site-related activity or as natural background. This comparison is generally valid for inorganic chemicals but not for

organic chemicals, because inorganic chemicals are naturally occurring and most organic chemicals related to potential releases are not. Statistical techniques are used as tools to aid the exercise of professional judgment in resolving site-related issues for metals, because metals are naturally present in most environmental media. The statistical techniques generally involve comparing the site data with background data.

The first statistical technique used for the background screen is the comparison of the MDC of the site data set to the PBOW background screening concentration (BSC). BSCs are considered representative concentrations of naturally occurring inorganic constituents; therefore, a comparison between the BSC and concentrations detected on site provides an indication of whether exposure to on-site media exceeds ambient levels. The background screening protocol used for the PBOW sites is based on PBOW Project Delivery Team (PDT) agreements (PBOW Project Delivery Team, 2000) and differs somewhat from the current OEPA (2009) guidance. Use of this PBOW PDT method for the development of BSCs and as part of the COPEC screening process ensures consistency between all of the PBOW FUDS project sites. The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998). The background soil samples were collected from near the property boundary, away from any potential source areas. BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC of the concentrations found in these background soil samples or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (PBOW Project Delivery Team, 2000). The upper tolerance limit is the concentration, with a probability of 0.95 (or a confidence of 95 percent), that would cover 95 percent of background population if a larger number of samples were collected. Chemicals with MDCs less than their respective BSCs are consistent with background concentrations and eliminated from further consideration. Use of this method for the development of BSCs and as part of the COPEC screening process ensures consistency between all of the PBOW Formerly Used Defense Sites project sites.

If the MDC of a chemical exceeds the BSC, the chemical is retained as a COPEC, or a more detailed statistical analysis may be performed to determine if the background data and the site data are drawn from the same population. The Wilcoxon Rank Sum test can be used for this purpose; however, that test was not used in the Coal Yard No. 1 SLERA because the one metal that was selected as a COPEC had insufficient background data to perform it.

Chemicals that fail the background evaluation are assumed to be site-related and are not eliminated at this point of the screening process.

2.2.3.4 Essential Nutrients

Evaluating essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required nutrients. Essential nutrients such as calcium, iron, magnesium, potassium, and sodium are usually eliminated as COPECs because they are generally considered to be innocuous in environmental media. Other essential nutrients, including chloride, iodine, and phosphorus, may be eliminated as COPECs, provided that their presence in a particular medium is shown to be unlikely to cause adverse effects to biological health.

2.2.4 Summary of COPEC Selection

The results of the COPEC screening for soil are presented in Table 2-2. The table presents the following information:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of detection limits
- Arithmetic mean (average) of site concentrations
- Distribution type
- Appropriate ESV
- BSC
- COPEC selection conclusion: NO (with rationale for exclusion) or YES (selected).

Ninety-five percent UCLs are also typically presented for COPECs, but computing a UCL was not considered necessary for the two chemicals identified as COPECs, as further explained in the following paragraphs. Footnotes in the table provide the rationale for selecting or rejecting a chemical as a COPEC.

Cadmium and dibenzofuran were the only two chemicals identified as COPECs in soil (Table 2-2). Cadmium was detected in six out of eight samples at concentrations ranging from 0.15 to 0.8 milligrams per kilogram (mg/kg). Concentrations from three samples (CY0005 = 0.52 mg/kg, CY0013 = 0.57 mg/kg, and CY0012 = 0.8 mg/kg) exceeded the ESV of 0.36 mg/kg. No BSC is available for cadmium because it was nondetect in all 25 soil background samples (IT, 1998). However, the reporting limits in the background data set (range = 0.57 to 1.2 mg/kg) approximated the detected concentrations at Coal Yard No. 1. Therefore, although possibly associated with remnant pieces of coal at the site, the detected concentrations of cadmium could also be naturally occurring. Further, the ESV of 0.36 mg/kg is based on an ecological soil screening level that is protective of a shrew receptor (EPA, 2008). Because of the very small spatial area where cadmium was present at concentrations above the ESV, the low concentrations

detected, and the natural population dynamics for small mammals that can rapidly compensate for localized impacts, it is highly unlikely that adverse population-level effects to shrews or other small mammals are occurring at this site. Therefore, cadmium is not recommended for further evaluation.

Dibenzofuran was detected in only one out of eight soil samples (sample CY0005) at a concentration of 0.103 mg/kg. The result for this sample was “J-flagged” because the detected concentration was below the sample reporting limit of 0.84 mg/kg. Dibenzofuran was selected as a COPEC because it lacked an ESV. Therefore, there is no evidence that dibenzofuran is toxic at the detected concentration. Dibenzofuran is a component of coal tar, which is made into creosote, which is widely used as a wood preservative (HSDB, 2013). Thus, its presence may be related to the former coal yard operations, or may simply be associated with typical infrastructure, materials, and processes at the NASA facility. Regardless, its presence in a single sample at a concentration below reporting limits suggests that this chemical is present neither as the result of a site-related release nor at sufficiently high concentrations to warrant concern for ecological receptors. The fact that the sample where dibenzofuran was detected (CY005) was collected from the 3 to 5 feet bgs soil sampling interval further reduces concern for ecological exposure, as soil 3 feet below the surface is unlikely to be regularly encountered by most environmental receptors. Therefore, dibenzofuran is not recommended for further evaluation.

As discussed in Chapter 2.0, the SLERA null hypotheses state that potential for adverse ecological effects is minimal or nonexistent due to the lack of viable habitat, potential ecological receptors, potential exposure pathways, and/or potential chemical stressors. Because no COPECs are recommended for further evaluation at Coal Yard No. 1, a predictive assessment is not triggered, and no further action for the protection of ecological receptors is considered necessary.

3.0 Risk Summary and Conclusions

Chemicals detected in soil were screened against conservative benchmark values and other criteria to identify COPECs at Coal Yard No. 1. Because of the small size of the site, the site is not spatially relevant to any significant degree for most ecological receptors. The site-specific SLERA was performed to satisfy administrative requirements, including Formerly Used Defense Sites regulations (USACE, 2004).

Cadmium and dibenzofuran were the only chemicals in soil that were identified as COPECs. Cadmium was detected in three samples at concentrations that marginally exceeded its ESV, and the area where the slightly elevated cadmium was detected was very limited in spatial size. Cadmium lacked a BSC because it was not detected in the PBOW background samples, but the reporting limits for this metal in the background data set approximate the concentrations that were detected at Coal Yard No.1. Therefore, it was judged that the presence of cadmium is either naturally occurring, inconsequential from an ecological standpoint, or both. Dibenzofuran was retained as a COPEC initially because no ESV was available for it. However, this chemical was detected in only a single sample at an estimated ("J-qualified") concentration below its reporting limit. Also, the sample where this chemical was detected was obtained from a depth of 3 feet bgs, which is below the surface soil zone where ecological exposure would be expected to be the highest. Because of the low concentrations and limited spatial area where these two chemicals were detected, the potential for adverse effects to local populations to occur as the result of exposure to them was judged to be extremely low. Therefore, no further investigation of cadmium or dibenzofuran is considered necessary for the purposes of environmental protection, and the potential for ecological hazard associated with exposure to these two chemicals is considered negligible.

4.0 References

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TABLES

Table 2-1

Summary of Soil Samples Evaluated in the Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Location	Sample Number	Sample Purpose	Sample Date	Depth of Sample (ft bgs)	Analysis
Surface Soil					
CY1-SB01	CY0001	REG	12/20/2011	0.5 - 1.5	Explosives, Metals, PCB, SVOC
CY1-SB02	CY0004	REG	12/20/2011	0.3 - 1.3	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0007	REG	12/20/2011	0.5 - 1.5	Explosives, Metals, PCB, SVOC
CY1-SB04	CY0012	REG	12/20/2011	1 - 2	Explosives, Metals, PCB, SVOC
CY1-SB01	CY0002	REG	12/20/2011	3 - 5	Explosives, Metals, PCB, SVOC
CY1-SB02	CY0005	REG	12/20/2011	3 - 5	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0008	REG	12/20/2011	3 - 5	Explosives, Metals, PCB, SVOC
CY1-SB03	CY0009	FD	12/20/2011	3 - 5	Explosives, Metals, PCB, SVOC
CY1-SB04	CY0013	REG	12/20/2011	3 - 5	Explosives, Metals, PCB, SVOC

FD - Field duplicate; averaged with regular sample.
ft bgs - Feet below ground surface.
PCB - Polychlorinated biphenyls.
REG - Regular sample.
SVOC - Semivolatile organic compounds.

Table 2-2

Statistical Summary and Selection of Chemicals of Potential Ecological Concern in Soil (0 to 6 feet bgs)
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	ESV [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	(mg/kg)	COPEC? [c,d]
Inorganics												
Aluminum	8 / 8	100	2.03E+03		1.23E+04		8.20E-01	2.10E+00	6.80E+03	1.55E+04	pH Dependent	N (b)
Antimony	5 / 8	63	1.20E-01	J	2.30E-01	J	4.10E-02	1.09E-01	1.32E-01	9.30E+00	0.27	N (b)
Arsenic	8 / 8	100	3.10E+00		3.46E+01		4.10E-02	1.09E-01	1.28E+01	3.65E+01	18	N (b)
Barium	8 / 8	100	1.85E+01		8.22E+01		4.10E-02	1.09E-01	4.70E+01	8.26E+02	330	N (b)
Beryllium	8 / 8	100	6.10E-02	J	6.50E-01		4.10E-03	1.09E-02	3.74E-01	1.00E+00	21	N (b)
Cadmium	6 / 8	75	1.50E-01	J	8.00E-01		4.10E-03	1.09E-02	3.22E-01	NA	0.36	Y
Calcium	8 / 8	100	4.47E+02		1.98E+04	J	2.00E+00	5.30E+00	4.63E+03	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	3.90E+00		1.90E+01		4.10E-02	1.09E-01	1.14E+01	2.90E+01	26	N (b)
Cobalt	8 / 8	100	7.90E-01	J	1.49E+01		4.10E-02	1.09E-01	6.61E+00	1.16E+02	13	N (b)
Copper	8 / 8	100	3.30E+00		2.58E+01		4.10E-02	1.09E-01	1.40E+01	5.62E+01	28	N (b)
Iron	8 / 8	100	7.84E+03		3.17E+04		1.40E+00	3.65E+00	1.74E+04	2.34E+05	pH Dependent	N (b)
Lead	8 / 8	100	4.80E+00		2.98E+01		4.10E-02	6.80E-02	1.11E+01	4.86E+01	11	N (b)
Magnesium	8 / 8	100	2.74E+02		8.22E+03	J	2.00E+00	5.30E+00	2.46E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	2.37E+01		3.46E+02	J	4.10E-02	1.09E-01	1.78E+02	3.51E+03	220	N (b)
Mercury	8 / 8	100	1.30E-02	J	4.90E-02	J	6.60E-03	7.40E-03	2.74E-02	8.50E-02	0.00051	N (b)
Nickel	8 / 8	100	2.30E+00		3.81E+01		4.10E-02	1.09E-01	1.61E+01	5.51E+01	38	N (b)
Potassium	8 / 8	100	2.02E+02	J	1.30E+03		2.00E+00	5.30E+00	6.61E+02	3.39E+03	Nutrient	N (c)
Silver	1 / 8	13	7.40E-02	J	7.40E-02	J	4.10E-02	1.09E-01	6.94E-02	1.11E+01	4.2	N (b)
Sodium	4 / 8	50	8.95E+01	J	1.11E+02	J	3.10E+01	8.00E+01	8.10E+01	NA	Nutrient	N (c)
Thallium	3 / 8	38	2.34E-01	J	6.40E-01	J	4.10E-02	6.80E-02	1.90E-01	1.30E+00	1	N (b)
Vanadium	8 / 8	100	8.00E+00		2.61E+01		4.10E-02	1.09E-01	1.87E+01	4.09E+01	7.8	N (b)
Zinc	8 / 8	100	9.40E+00		1.57E+02		4.10E-02	1.09E-01	4.82E+01	3.22E+02	46	N (b)
Semivolatile Organic Compounds												
Dibenzofuran	1 / 8	13	1.03E-01	J	1.03E-01	J	2.00E-02	8.40E-02	3.13E-02		NSV	Y
Fluoranthene	2 / 8	25	3.13E-02	J	1.38E-01	J	2.00E-02	8.40E-02	3.67E-02		1.1	N (a)
Fluorene	1 / 8	13	1.05E-01	J	1.05E-01	J	2.00E-02	8.40E-02	3.15E-02		1.1	N (a)
Methylnaphthalene, 2-	2 / 8	25	2.64E-02	J	3.34E-02	J	2.00E-02	8.40E-02	3.10E-02		3.24	N (a)
Naphthalene	1 / 8	13	1.83E-01	J	1.83E-01	J	3.20E-02	1.30E-01	6.40E-02		29	N (a)
Phenanthrene	1 / 8	13	2.55E-02	J	2.55E-02	J	2.00E-02	8.40E-02	2.92E-02		29	N (a)
Pyrene	2 / 8	25	3.09E-02	J	1.24E-01	J	2.00E-02	8.40E-02	3.49E-02		1.1	N (a)

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas***, Plum Brook Ordnance Works, Sandusky, Ohio, August.
[b] ESVs and their sources are in Appendix B.
[c] N = Chemical is not chosen as a COPEC:
(a) = maximum detected concentration is less than the ESV.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.

FIGURES

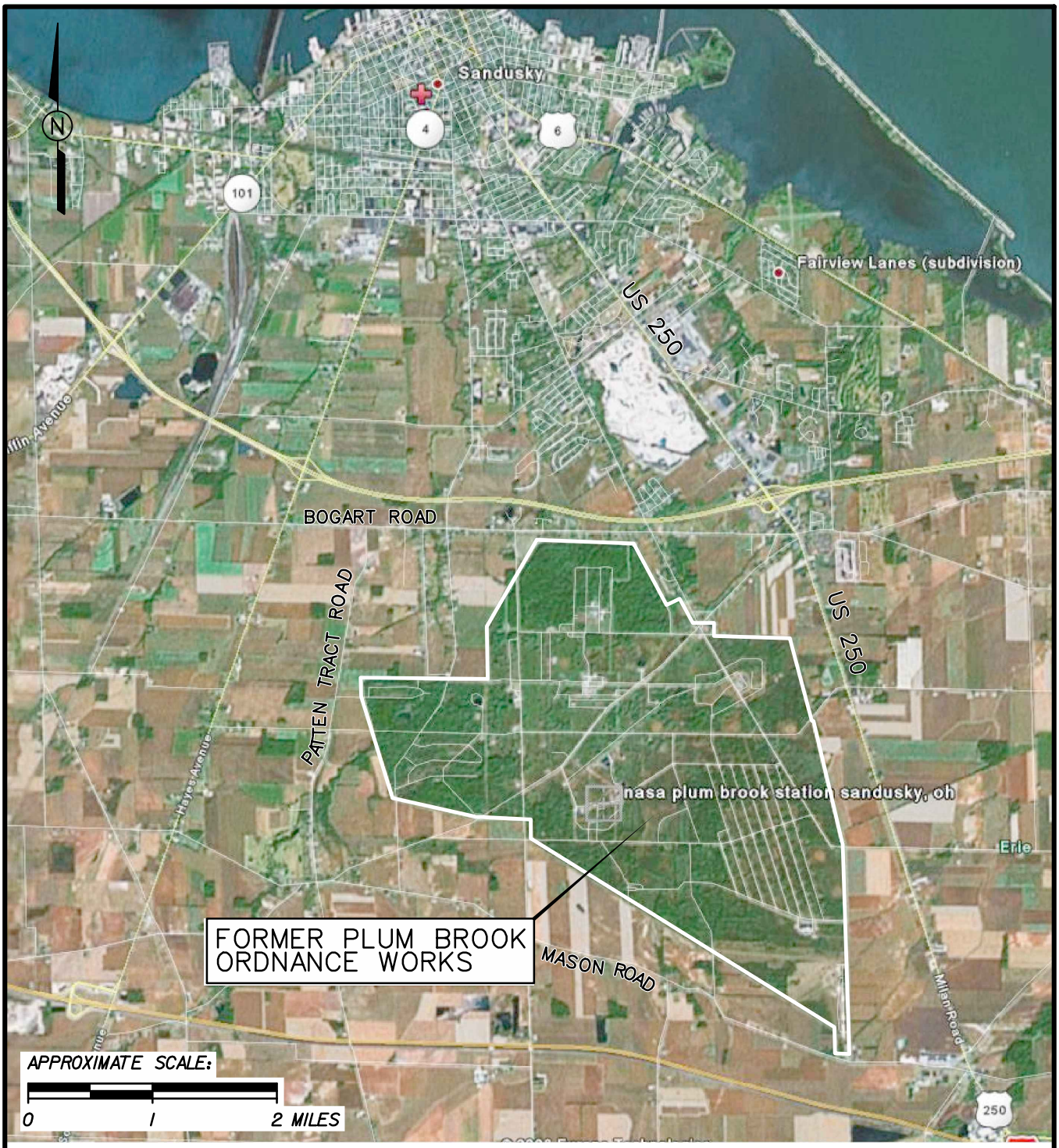

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT No. 1 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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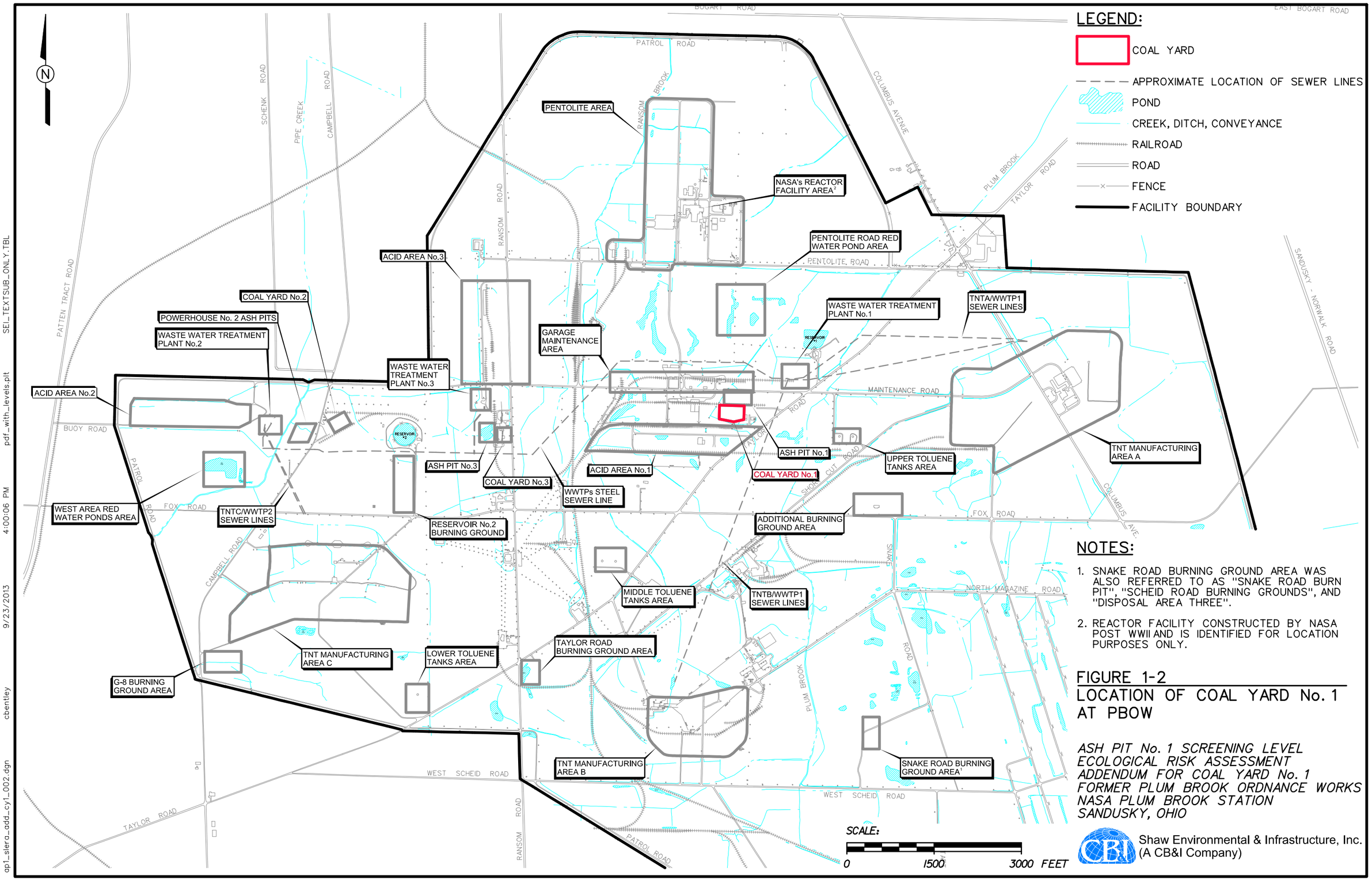


NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

FIGURE 1-2
LOCATION OF COAL YARD No. 1 AT PBOW

ASH PIT No. 1 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

ap1_sler.a_add_cy1_002.dgn cbentley 9/23/2013 4:00:06 PM pdf_with_levels.plt SEL_TEXTSUB_ONLY.TBL

Figure 2-1

Photographic Log of Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Photo 1. Grassy habitat at Coal Yard No. 1.

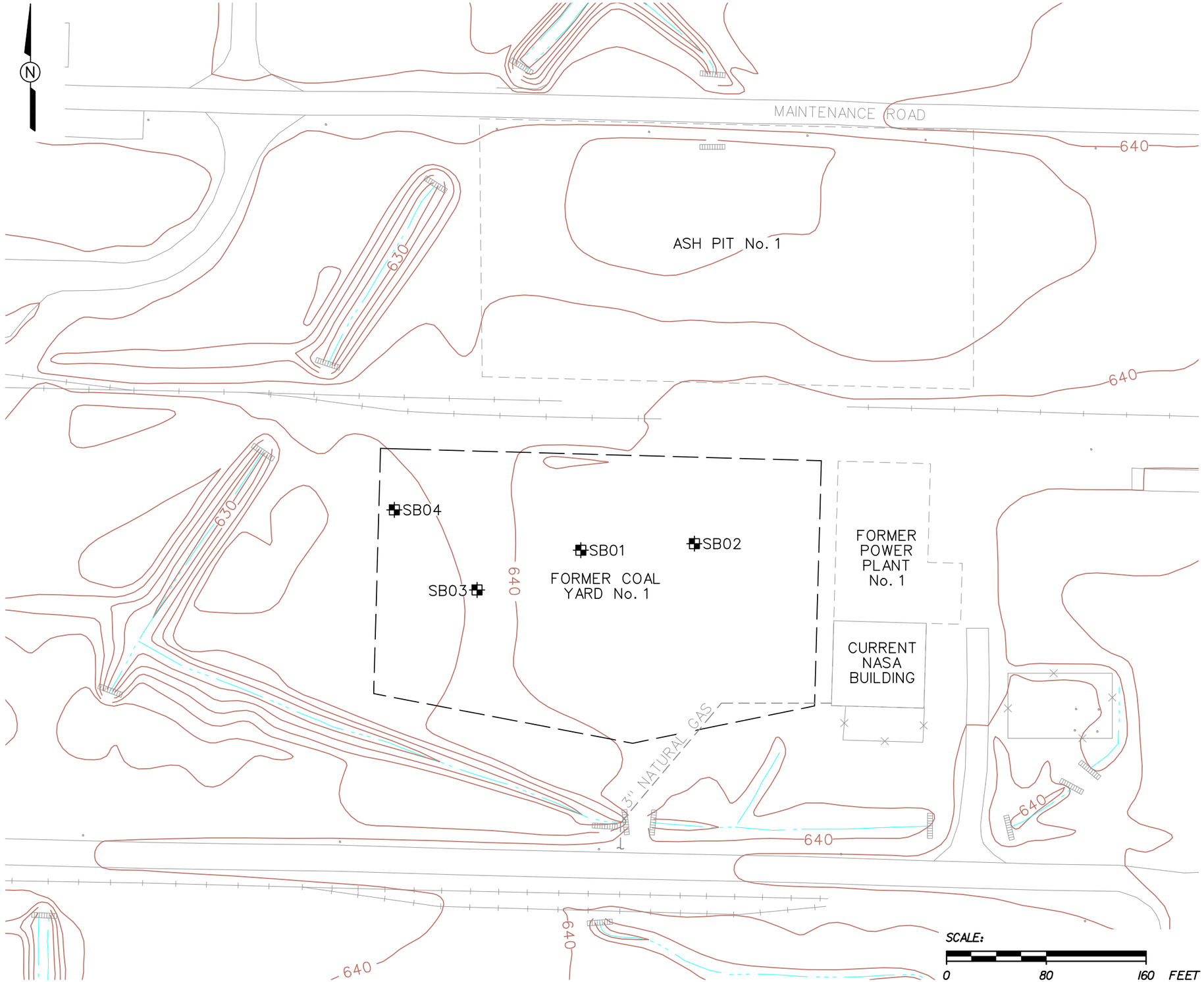
Photo 2. Grass and shrub habitat at Coal Yard No. 1.

Figure 2-1

Photographic Log of Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Photo 3. Herbaceous vegetation at Coal Yard No. 1.

Photo 4. Bare ground with small pieces of coal at Coal Yard No. 1.



LEGEND:

- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES
- APPROXIMATE HISTORICAL COAL STORAGE PERIMETER BASED ON AERIAL PHOTO
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTEVAL)

FIGURE 2-2
SAMPLE LOCATIONS AT COAL YARD No. 1

ASH PIT No. 1 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 1 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

ap1_slerc_add_cy1_003.dgn cbentley 4/17/2013 2:04:09 PM PDF_with_Levels.plt SEL_TEXTSUB_ONLY.TBL

APPENDIX A

SOIL DATA USED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB01					CY1-SB01					CY1-SB02				
SAMPLE_NO		CY0001					CY0002					CY0004				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		0.5 - 1.5 Ft					3 - 5 Ft					0.3 - 1.3 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Dinitrobenzene, 1,3-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Dinitrotoluene, 2,4-	mg/kg	0.19	0.19	0.093	U	U	0.15	0.15	0.075	U	U	0.16	0.16	0.079	U	U
Dinitrotoluene, 2,6-	mg/kg	0.19	0.19	0.084	U	U	0.15	0.15	0.067	U	U	0.16	0.16	0.071	U	U
HMX	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrobenzene	mg/kg	0.19	0.19	0.089	U	U	0.15	0.15	0.072	U	U	0.16	0.16	0.076	U	U
Nitrotoluene, 2-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrotoluene, 3-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrotoluene, 4-	mg/kg	0.19	0.19	0.097	U	U	0.15	0.15	0.078	U	U	0.16	0.16	0.082	U	U
RDX	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Tetryl	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.19	0.19	0.077	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
General Chemistry																
% Solids	Percent	83.3	0				78.7	0				83.1	0			
Total organic carbon	Percent	0.27	0.2	0.2												
Metals																
Aluminum	mg/kg	4660	11	1.1			10100	21	2.1			2030	8.2	0.82		
Antimony	mg/kg	0.12	1.1	0.053	B	J	2.1	2.1	0.1	U	U	0.14	0.82	0.041	B	J
Arsenic	mg/kg	3.1	0.53	0.053			7.9	1	0.1			34.6	0.41	0.041		
Barium	mg/kg	18.5	11	0.053			73.8	21	0.1			23.9	8.2	0.041		
Beryllium	mg/kg	0.24	0.27	0.0053	B	J	0.52	0.52	0.01			0.061	0.2	0.0041	B	J
Cadmium	mg/kg	0.21	0.21	0.0053	U	U	0.15	0.41	0.01	B	J	0.16	0.16	0.0041	U	U
Calcium	mg/kg	727	270	2.7			5470	520	5.2			447	200	2		
Chromium	mg/kg	7.8	0.53	0.053			15.4	1	0.1			3.9	0.41	0.041		
Cobalt	mg/kg	3.1	2.7	0.053			8.3	5.2	0.1			0.79	2	0.041	B	J
Copper	mg/kg	6	1.3	0.053			19.4	2.6	0.1			3.3	1	0.041		
Iron	mg/kg	8320	16	1.8			18800	31	3.5			7840	12	1.4		
Lead	mg/kg	4.8	1.1	0.053			10.7	1	0.052			5.5	0.82	0.041		
Magnesium	mg/kg	614	270	2.7			3710	520	5.2			274	200	2		
Manganese	mg/kg	30.6	0.8	0.053			316	1.5	0.1			23.7	0.61	0.041		
Mercury	mg/kg	0.013	0.092	0.0066	B	J	0.021	0.098	0.0069	B	J	0.022	0.096	0.0068	B	J
Nickel	mg/kg	7.8	2.1	0.053			23.1	4.1	0.1			2.3	1.6	0.041		
Potassium	mg/kg	212	530	2.7	B	J	744	1000	5.2	B	J	202	410	2	B	J
Selenium	mg/kg	1.1	1.1	0.11	U	U	2.1	2.1	0.21	U	U	0.82	0.82	0.082	U	U
Silver	mg/kg	0.53	0.53	0.053	U	U	1	1	0.1	U	U	0.41	0.41	0.041	U	U
Sodium	mg/kg	530	530	40	U	U	1000	1000	77	U	U	111	410	31	B	J
Thallium	mg/kg	0.53	0.53	0.053	U	U	0.52	0.52	0.052	U	U	0.41	0.41	0.041	U	U
Vanadium	mg/kg	15.4	2.7	0.053			25.2	5.2	0.1			8	2	0.041		
Zinc	mg/kg	21.3	1.1	0.053			43.9	2.1	0.1			9.4	0.82	0.041		
PCBs																
Aroclor 1016	mg/kg	0.02	0.02	0.0079	U	U	0.021	0.021	0.0084	U	U	0.02	0.02	0.008	U	U
Aroclor 1221	mg/kg	0.02	0.02	0.0098	U	U	0.021	0.021	0.011	U	U	0.02	0.02	0.01	U	U
Aroclor 1232	mg/kg	0.02	0.02	0.0098	U	U	0.021	0.021	0.011	U	U	0.02	0.02	0.01	U	U
Aroclor 1242	mg/kg	0.02	0.02	0.0079	U	U	0.021	0.021	0.0084	U	U	0.02	0.02	0.008	U	U
Aroclor 1248	mg/kg	0.02	0.02	0.0079	U	U	0.021	0.021	0.0084	U	U	0.02	0.02	0.008	U	U
Aroclor 1254	mg/kg	0.02	0.02	0.0079	U	U	0.021	0.021	0.0084	U	U	0.02	0.02	0.008	U	U
Aroclor 1260	mg/kg	0.02	0.02	0.0079	U	U	0.021	0.021	0.0084	U	U	0.02	0.02	0.008	U	U
Semivolatiles																
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	0.2	0.029	U	U	0.21	0.21	0.031	U	U	0.2	0.2	0.029	U	U
Acenaphthene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Acenaphthylene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Anthracene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzo(a)anthracene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzo(a)pyrene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzo(b)fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzo(ghi)perylene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzo(k)fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Benzoic acid	mg/kg	1	1	0.35	U	U	1.1	1.1	0.38	U	U	1	1	0.36	U	U
Benzyl alcohol	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	0.4	0.08	U	U	0.43	0.43	0.086	U	U	0.41	0.41	0.081	U	U

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB01					CY1-SB01					CY1-SB02				
SAMPLE_NO		CY0001					CY0002					CY0004				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		0.5 - 1.5 Ft					3 - 5 Ft					0.3 - 1.3 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Bromophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Butyl benzyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Carbazole	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Chloroaniline, 4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Chloronaphthalene, 2-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Chlorophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Chrysene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Dibenz(a,h)anthracene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Dibenzofuran	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.4	0.4	0.04	U	U	0.43	0.43	0.043	U	U	0.41	0.41	0.041	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Diethyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.43	0.43	0.086	U	U	0.41	0.41	0.081	U	U
Dimethyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	0.2	0.025	U	U	0.21	0.21	0.027	U	U	0.2	0.2	0.026	U	U
Di-n-butyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.43	0.43	0.086	U	U	0.41	0.41	0.081	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	0.4	0.08	U	U	0.43	0.43	0.086	U	U	0.41	0.41	0.081	U	U
Dinitrophenol, 2,4-	mg/kg	1	1	0.4	U	U	1.1	1.1	0.43	U	U	1	1	0.41	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	0.2	0.024	U	U	0.21	0.21	0.025	U	U	0.2	0.2	0.024	U	U
Di-n-octyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Fluorene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Hexachlorobenzene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Hexachlorobutadiene	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	0.2	0.088	U	U	0.21	0.21	0.094	U	U	0.2	0.2	0.089	U	U
Hexachloroethane	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Isophorone	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Methylnaphthalene, 2-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Methylphenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Naphthalene	mg/kg	0.2	0.2	0.032	U	U	0.21	0.21	0.034	U	U	0.2	0.2	0.032	U	U
Nitroaniline, 2-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Nitroaniline, 3-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Nitroaniline, 4-	mg/kg	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U	0.2	0.2	0.041	U	U
Nitrobenzene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 4-	mg/kg	1	1	0.16	U	U	1.1	1.1	0.17	U	U	1	1	0.16	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Pentachlorophenol	mg/kg	1	1	0.24	U	U	1.1	1.1	0.26	U	U	1	1	0.24	U	U
Phenanthrene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Phenol	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Pyrene	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U	0.2	0.2	0.02	U	U

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB02					CY1-SB03					CY1-SB03				
SAMPLE_NO		CY0005					CY0007					CY0008				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		3 - 5 Ft					0.5 - 1.5 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Dinitrobenzene, 1,3-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Dinitrotoluene, 2,4-	mg/kg	0.16	0.16	0.076	U	U	0.17	0.17	0.084	U	U	0.17	0.17	0.083	U	U
Dinitrotoluene, 2,6-	mg/kg	0.16	0.16	0.068	U	U	0.17	0.17	0.076	U	U	0.17	0.17	0.075	U	U
HMX	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Nitrobenzene	mg/kg	0.16	0.16	0.073	U	U	0.17	0.17	0.081	U	U	0.17	0.17	0.08	U	U
Nitrotoluene, 2-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Nitrotoluene, 3-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Nitrotoluene, 4-	mg/kg	0.16	0.16	0.079	U	U	0.17	0.17	0.088	U	U	0.17	0.17	0.087	U	U
RDX	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Tetryl	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.16	0.16	0.063	U	U	0.17	0.17	0.07	U	U	0.17	0.17	0.069	U	U
General Chemistry																
% Solids	Percent	79.7	0				82.9	0				78.2	0			
Total organic carbon	Percent															
Metals																
Aluminum	mg/kg	6020	12	1.2			5020	12	1.2			11400	19	1.9		
Antimony	mg/kg	0.23	1.2	0.062	B	J	1.2	1.2	0.06	U	U	1.9	1.9	0.097	U	U
Arsenic	mg/kg	3.8	0.62	0.062			9	0.6	0.06			12.5	0.97	0.097		
Barium	mg/kg	44	12	0.062			31.6	12	0.06			84.6	19	0.097		
Beryllium	mg/kg	0.5	0.31	0.0062			0.32	0.3	0.006			0.63	0.48	0.0097		
Cadmium	mg/kg	0.52	0.25	0.0062			0.17	0.24	0.006	B	J	0.33	0.39	0.0097	B	J
Calcium	mg/kg	4140	310	3.1			2340	300	3			3110	480	4.8		
Chromium	mg/kg	10.7	0.62	0.062			8.7	0.6	0.06			17.8	0.97	0.097		
Cobalt	mg/kg	9.5	3.1	0.062			3.3	3	0.06			14.1	4.8	0.097		
Copper	mg/kg	18.3	1.6	0.062			7.5	1.5	0.06			24.8	2.4	0.097		
Iron	mg/kg	17300	19	2.1			12700	18	2.1			26000	29	3.3		
Lead	mg/kg	29.8	1.2	0.062			7.2	1.2	0.06			12.8	0.97	0.048		
Magnesium	mg/kg	1180	310	3.1			1090	300	3			3950	480	4.8		
Manganese	mg/kg	188	0.93	0.062			148	0.9	0.06			230	1.5	0.097		J
Mercury	mg/kg	0.037	0.1	0.0074	B	J	0.034	0.094	0.0067	B	J	0.02	0.1	0.0073	B	J
Nickel	mg/kg	13.6	2.5	0.062			9.4	2.4	0.06			37.2	3.9	0.097		
Potassium	mg/kg	435	620	3.1	B	J	400	600	3	B	J	1390	970	4.8		
Selenium	mg/kg	1.2	1.2	0.12	U	U	1.2	1.2	0.12	U	U	1.9	1.9	0.19	U	U
Silver	mg/kg	0.62	0.62	0.062	U	U	0.6	0.6	0.06	U	U	0.97	0.97	0.097	U	U
Sodium	mg/kg	620	620	47	U	U	111	600	45	B	J	970	970	73	U	U
Thallium	mg/kg	0.62	0.62	0.062	U	U	0.6	0.6	0.06	U	U	0.41	0.48	0.048	B	J
Vanadium	mg/kg	18.1	3.1	0.062			16.6	3	0.06			23.2	4.8	0.097		
Zinc	mg/kg	157	1.2	0.062			21.1	1.2	0.06			57	1.9	0.097		
PCBs																
Aroclor 1016	mg/kg	0.021	0.021	0.0082	U	U	0.02	0.02	0.0079	U	U	0.021	0.021	0.0085	U	U
Aroclor 1221	mg/kg	0.021	0.021	0.01	U	U	0.02	0.02	0.0099	U	U	0.021	0.021	0.011	U	U
Aroclor 1232	mg/kg	0.021	0.021	0.01	U	U	0.02	0.02	0.0099	U	U	0.021	0.021	0.011	U	U
Aroclor 1242	mg/kg	0.021	0.021	0.0082	U	U	0.02	0.02	0.0079	U	U	0.021	0.021	0.0085	U	U
Aroclor 1248	mg/kg	0.021	0.021	0.0082	U	U	0.02	0.02	0.0079	U	U	0.021	0.021	0.0085	U	U
Aroclor 1254	mg/kg	0.021	0.021	0.0082	U	U	0.02	0.02	0.0079	U	U	0.021	0.021	0.0085	U	U
Aroclor 1260	mg/kg	0.021	0.021	0.0082	U	U	0.02	0.02	0.0079	U	U	0.021	0.021	0.0085	U	U
Semivolatiles																
3-Methylphenol and 4-Methylphenol	mg/kg	0.84	0.84	0.12	U	U	0.2	0.2	0.028	U	U	0.21	0.21	0.031	U	U
Acenaphthene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Acenaphthylene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Anthracene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzo(a)anthracene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzo(a)pyrene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzo(b)fluoranthene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzo(ghi)perylene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzo(k)fluoranthene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Benzoic acid	mg/kg	4.2	4.2	1.5	U	U	0.99	0.99	0.35	U	U	1.1	1.1	0.38	U	U
Benzyl alcohol	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Bis(2-chloroethyl)ether	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	1.7	1.7	0.34	U	U	0.4	0.4	0.079	U	U	0.43	0.43	0.086	U	U

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB02					CY1-SB03					CY1-SB03				
SAMPLE_NO		CY0005					CY0007					CY0008				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		3 - 5 Ft					0.5 - 1.5 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Bromophenyl phenyl ether, 4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Butyl benzyl phthalate	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Carbazole	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Chloroaniline, 4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Chloronaphthalene, 2-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Chlorophenol, 2-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Chrysene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Dibenz(a,h)anthracene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Dibenzofuran	mg/kg	0.103	0.84	0.084	J	J	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Dichlorobenzene, 1,2-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Dichlorobenzene, 1,3-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Dichlorobenzene, 1,4-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Dichlorobenzidine, 3,3'-	mg/kg	1.7	1.7	0.17	U	U	0.4	0.4	0.04	U	U	0.43	0.43	0.043	U	U
Dichlorophenol, 2,4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Diethyl phthalate	mg/kg	1.7	1.7	0.34	U	U	0.4	0.4	0.079	U	U	0.43	0.43	0.086	U	U
Dimethyl phthalate	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Dimethylphenol, 2,4-	mg/kg	0.84	0.84	0.11	U	U	0.2	0.2	0.025	U	U	0.21	0.21	0.027	U	U
Di-n-butyl phthalate	mg/kg	1.7	1.7	0.34	U	U	0.4	0.4	0.079	U	U	0.43	0.43	0.086	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	1.7	1.7	0.34	U	U	0.4	0.4	0.079	U	U	0.43	0.43	0.086	U	U
Dinitrophenol, 2,4-	mg/kg	4.2	4.2	1.7	U	U	0.99	0.99	0.4	U	U	1.1	1.1	0.43	U	U
Dinitrotoluene, 2,4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Dinitrotoluene, 2,6-	mg/kg	0.84	0.84	0.099	U	U	0.2	0.2	0.023	U	U	0.21	0.21	0.025	U	U
Di-n-octyl phthalate	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Fluoranthene	mg/kg	0.138	0.84	0.084	J	J	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Fluorene	mg/kg	0.105	0.84	0.084	J	J	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Hexachlorobenzene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Hexachlorobutadiene	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Hexachlorocyclopentadiene	mg/kg	0.84	0.84	0.37	U	U	0.2	0.2	0.087	U	U	0.21	0.21	0.094	U	U
Hexachloroethane	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Isophorone	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Methylnaphthalene, 2-	mg/kg	0.84	0.84	0.084	U	U	0.0264	0.2	0.02	J	J	0.21	0.21	0.021	U	U
Methylphenol, 2-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Naphthalene	mg/kg	0.84	0.84	0.13	U	U	0.2	0.2	0.032	U	U	0.21	0.21	0.034	U	U
Nitroaniline, 2-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Nitroaniline, 3-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Nitroaniline, 4-	mg/kg	0.84	0.84	0.17	U	U	0.2	0.2	0.04	U	U	0.21	0.21	0.043	U	U
Nitrobenzene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Nitrophenol, 2-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Nitrophenol, 4-	mg/kg	4.2	4.2	0.67	U	U	0.99	0.99	0.16	U	U	1.1	1.1	0.17	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
n-Nitrosodiphenylamine	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Pentachlorophenol	mg/kg	4.2	4.2	1	U	U	0.99	0.99	0.24	U	U	1.1	1.1	0.26	U	U
Phenanthrene	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Phenol	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Pyrene	mg/kg	0.124	0.84	0.084	J	J	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.84	0.84	0.084	U	U	0.2	0.2	0.02	U	U	0.21	0.21	0.021	U	U

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB03					CY1-SB04					CY1-SB04				
SAMPLE_NO		CY0009					CY0012					CY0013				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		3 - 5 Ft					1 - 2 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		FD					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Dinitrobenzene, 1,3-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	0.2	0.096	U	U	0.15	0.15	0.071	U	U	0.15	0.15	0.071	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	0.2	0.086	U	U	0.15	0.15	0.063	U	U	0.15	0.15	0.064	U	U
HMX	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Nitrobenzene	mg/kg	0.2	0.2	0.092	U	U	0.15	0.15	0.068	U	U	0.15	0.15	0.068	U	U
Nitrotoluene, 2-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Nitrotoluene, 3-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Nitrotoluene, 4-	mg/kg	0.2	0.2	0.1	U	U	0.15	0.15	0.073	U	U	0.15	0.15	0.074	U	U
RDX	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Tetryl	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.2	0.2	0.079	U	U	0.15	0.15	0.058	U	U	0.15	0.15	0.059	U	U
General Chemistry																
% Solids	Percent	78.9	0				74	0				76.5	0			
Total organic carbon	Percent															
Metals																
Aluminum	mg/kg	13100	23	2.3			5480	14	1.4			8830	11	1.1		J
Antimony	mg/kg	2.3	2.3	0.12	U	U	0.17	1.4	0.068	B	J	0.13	1.1	0.057	B	J
Arsenic	mg/kg	10.1	1.2	0.12			24.6	0.68	0.068			8.4	0.57	0.057		J
Barium	mg/kg	79.8	23	0.12			46.5	14	0.068			55.1	11	0.057		J
Beryllium	mg/kg	0.67	0.58	0.012			0.26	0.34	0.0068	B	J	0.44	0.29	0.0057		J
Cadmium	mg/kg	0.38	0.47	0.012	B	J	0.8	0.27	0.0068			0.57	0.23	0.0057		J
Calcium	mg/kg	2910	580	5.8			1080	340	3.4			19800	290	2.9		J
Chromium	mg/kg	20.1	1.2	0.12			13	0.68	0.068			13	0.57	0.057		J
Cobalt	mg/kg	15.7	5.8	0.12			3.3	3.4	0.068	B	J	9.7	2.9	0.057		J
Copper	mg/kg	26.7	2.9	0.12			12	1.7	0.068			19.9	1.4	0.057		J
Iron	mg/kg	20700	35	4			31700	20	2.3			19100	17	1.9		J
Lead	mg/kg	10.6	1.2	0.058			7.6	1.4	0.068			11.4	1.1	0.057		
Magnesium	mg/kg	3710	580	5.8			748	340	3.4			8220	290	2.9		J
Manganese	mg/kg	461	1.7	0.12		J	93.6	1	0.068			279	0.86	0.057		J
Mercury	mg/kg	0.031	0.11	0.0075	B	J	0.049	0.098	0.007	B	J	0.018	0.1	0.0073	B	J
Nickel	mg/kg	39	4.7	0.12			9.8	2.7	0.068			24.7	2.3	0.057		J
Potassium	mg/kg	1210	1200	5.8			716	680	3.4			1280	570	2.9		J
Selenium	mg/kg	2.3	2.3	0.23	U	U	1.4	1.4	0.14	U	U	1.1	1.1	0.11	U	UJ
Silver	mg/kg	1.2	1.2	0.12	U	U	0.074	0.68	0.068	B	J	0.57	0.57	0.057	U	UJ
Sodium	mg/kg	1200	1200	87	U	U	89.5	680	51	B	J	92.3	570	43	B	J
Thallium	mg/kg	0.58	0.58	0.058	U	U	0.64	0.68	0.068	B	J	0.38	0.57	0.057	B	J
Vanadium	mg/kg	28.9	5.8	0.12			22.8	3.4	0.068			17.1	2.9	0.057		J
Zinc	mg/kg	62.9	2.3	0.12			27.9	1.4	0.068			44.7	1.1	0.057		J
PCBs																
Aroclor 1016	mg/kg	0.021	0.021	0.0084	U	U	0.022	0.022	0.009	U	U	0.021	0.021	0.0086	U	U
Aroclor 1221	mg/kg	0.021	0.021	0.01	U	U	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1232	mg/kg	0.021	0.021	0.01	U	U	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1242	mg/kg	0.021	0.021	0.0084	U	U	0.022	0.022	0.009	U	U	0.021	0.021	0.0086	U	U
Aroclor 1248	mg/kg	0.021	0.021	0.0084	U	U	0.022	0.022	0.009	U	U	0.021	0.021	0.0086	U	U
Aroclor 1254	mg/kg	0.021	0.021	0.0084	U	U	0.022	0.022	0.009	U	U	0.021	0.021	0.0086	U	U
Aroclor 1260	mg/kg	0.021	0.021	0.0084	U	U	0.022	0.022	0.009	U	U	0.021	0.021	0.0086	U	U
Semivolatiles																
3-Methylphenol and 4-Methylphenol	mg/kg	0.21	0.21	0.031	U	U	0.23	0.23	0.033	U	U	0.22	0.22	0.031	U	U
Acenaphthene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Acenaphthylene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Anthracene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzo(a)anthracene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzo(a)pyrene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzo(b)fluoranthene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzo(ghi)perylene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzo(k)fluoranthene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Benzoic acid	mg/kg	1.1	1.1	0.37	U	U	1.1	1.1	0.4	U	U	1.1	1.1	0.38	U	U
Benzyl alcohol	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Bis(2-chloroethyl)ether	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.43	0.43	0.085	U	U	0.46	0.46	0.092	U	U	0.44	0.44	0.087	U	U

Appendix A

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY1-SB03					CY1-SB04					CY1-SB04				
SAMPLE_NO		CY0009					CY0012					CY0013				
SAMPLE_DATE		12/20/2011					12/20/2011					12/20/2011				
DEPTH		3 - 5 Ft					1 - 2 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		FD					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Bromophenyl phenyl ether, 4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Butyl benzyl phthalate	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Carbazole	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Chloroaniline, 4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Chloronaphthalene, 2-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Chlorophenol, 2-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Chrysene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Dibenz(a,h)anthracene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Dibenzofuran	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Dichlorobenzene, 1,2-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Dichlorobenzene, 1,3-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Dichlorobenzene, 1,4-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.43	0.43	0.043	U	U	0.46	0.46	0.046	U	U	0.44	0.44	0.044	U	U
Dichlorophenol, 2,4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Diethyl phthalate	mg/kg	0.43	0.43	0.085	U	U	0.46	0.46	0.092	U	U	0.44	0.44	0.087	U	U
Dimethyl phthalate	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Dimethylphenol, 2,4-	mg/kg	0.21	0.21	0.027	U	U	0.23	0.23	0.029	U	U	0.22	0.22	0.027	U	U
Di-n-butyl phthalate	mg/kg	0.43	0.43	0.085	U	U	0.46	0.46	0.092	U	U	0.44	0.44	0.087	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.43	0.43	0.085	U	U	0.46	0.46	0.092	U	U	0.44	0.44	0.087	U	U
Dinitrophenol, 2,4-	mg/kg	1.1	1.1	0.43	U	U	1.1	1.1	0.46	U	U	1.1	1.1	0.44	U	U
Dinitrotoluene, 2,4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Dinitrotoluene, 2,6-	mg/kg	0.21	0.21	0.025	U	U	0.23	0.23	0.027	U	U	0.22	0.22	0.026	U	U
Di-n-octyl phthalate	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Fluoranthene	mg/kg	0.21	0.21	0.021	U	U	0.0313	0.23	0.023	J	J	0.22	0.22	0.022	U	U
Fluorene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Hexachlorobenzene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Hexachlorobutadiene	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Hexachlorocyclopentadiene	mg/kg	0.21	0.21	0.094	U	U	0.23	0.23	0.1	U	U	0.22	0.22	0.096	U	U
Hexachloroethane	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Isophorone	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Methylnaphthalene, 2-	mg/kg	0.21	0.21	0.021	U	U	0.0334	0.23	0.023	J	J	0.22	0.22	0.022	U	U
Methylphenol, 2-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Naphthalene	mg/kg	0.21	0.21	0.034	U	U	0.183	0.23	0.037	J	J	0.22	0.22	0.035	U	U
Nitroaniline, 2-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Nitroaniline, 3-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Nitroaniline, 4-	mg/kg	0.21	0.21	0.043	U	U	0.23	0.23	0.046	U	U	0.22	0.22	0.044	U	U
Nitrobenzene	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Nitrophenol, 2-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Nitrophenol, 4-	mg/kg	1.1	1.1	0.17	U	U	1.1	1.1	0.18	U	U	1.1	1.1	0.17	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
n-Nitrosodiphenylamine	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Pentachlorophenol	mg/kg	1.1	1.1	0.26	U	U	1.1	1.1	0.27	U	U	1.1	1.1	0.26	U	U
Phenanthrene	mg/kg	0.21	0.21	0.021	U	U	0.0255	0.23	0.023	J	J	0.22	0.22	0.022	U	U
Phenol	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Pyrene	mg/kg	0.21	0.21	0.021	U	U	0.0309	0.23	0.023	J	J	0.22	0.22	0.022	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.21	0.21	0.021	U	U	0.23	0.23	0.023	U	U	0.22	0.22	0.022	U	U

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligrams per kilogram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

APPENDIX B

ECOLOGICAL SCREENING VALUES FOR SOIL

Appendix B

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Inorganic Analytes							
Aluminum	7429-90-5	pH Dependent	NSV	NSV	NSV	50	pH Dependent
Antimony	7440-36-0	0.27	5	0.142	NSV	5	0.27
Arsenic	7440-38-2	18	9.9	5.7	60	10	18
Barium	7440-39-3	330	283	1.04	NSV	500	330
Beryllium	7440-41-7	21	10	1.06	NSV	10	21
Cadmium	7440-43-9	0.36	4	0.00222	20	4	0.36
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV	Nutrient
Chromium	7440-47-3	26	0.4	0.4	0.4	1	26
Chromium, hexavalent	18540-29-9	81	NSV	NSV	NSV	NSV	81
Cobalt	7440-48-4	13	20	0.14	NSV	20	13
Copper	7440-50-8	28	60	5.4	50	100	28
Iron	7439-89-6	pH Dependent	NSV	NSV	NSV	NSV	pH Dependent
Lead	7439-92-1	11	40.5	0.0537	500	50	11
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV	Nutrient
Manganese	7439-96-5	220	NSV	NSV	NSV	500	220
Mercury	7439-97-6	NSV	0.00051	0.1	0.1	0.3	0.00051
Nickel	7440-02-0	38	30	13.6	200	30	38
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV	Nutrient
Selenium	7782-49-2	0.52	0.21	0.0276	70	1	0.52
Silver	7440-22-4	4.2	2	4.04	NSV	2	4.2
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV	Nutrient
Thallium	7440-28-0	NSV	1	0.0569	NSV	1	1
Vanadium	7440-62-2	7.8	2	1.59	NSV	2	7.8
Zinc	7440-66-6	46	8.5	6.62	200	50	46
Cyanide							
Cyanide, Total	57-12-5	NSV	NSV	1.33	NSV	NSV	1.33
Polychlorinated Biphenyls							
Aroclor 1016	12674-11-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1221	11104-28-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1232	11141-16-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1242	53469-21-9	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1254	11097-69-1	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1260	11096-82-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371

Appendix B

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Organochlorine Pesticides							
4,4'-DDE	72-55-9	0.021 [g]	NSV	0.596	NSV	NSV	0.021
4,4'-DDT	50-29-3	0.021 [g]	NSV	0.0035	NSV	NSV	0.021
Methoxychlor	72-43-5	NSV	NSV	0.0199	NSV	NSV	0.0199
Nitroaromatics							
Amino-2,6-dinitrotoluene, 4-	19406-51-0	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328
Amino-4,6-dinitrotoluene, 2-	35572-78-2	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328
Dinitrobenzene, 1,3-	99-65-0	NSV	NSV	0.655	NSV	NSV	0.655
Dinitrotoluene, 2,4-	121-14-2	NSV	NSV	1.28	NSV	NSV	1.28
Dinitrotoluene, 2,6-	606-20-2	NSV	NSV	0.0328	NSV	NSV	0.0328
RDX	121-82-4	NSV	NSV	NSV	NSV	NSV	NSV
Tetryl	479-45-8	NSV	NSV	NSV	NSV	NSV	NSV
Trinitrobenzene, 1,3,5-	99-35-4	NSV	NSV	0.376	NSV	NSV	0.376
Trinitrotoluene, 2,4,6-	118-96-7	NSV	NSV	NSV	NSV	NSV	NSV
Semivolatile Organic Compounds							
Acenaphthene	83-32-9	29	20	682	NSV	20	29
Acenaphthylene	208-96-8	29	NSV	682	NSV	NSV	29
Anthracene	120-12-7	29	NSV	1480	NSV	NSV	29
Benzo(a)anthracene	56-55-3	1.1	NSV	5.21	NSV	NSV	1.1
Benzo(a)pyrene	50-32-8	1.1	NSV	1.52	NSV	NSV	1.1
Benzo(b)fluoranthene	205-99-2	1.1	NSV	59.8	NSV	NSV	1.1
Benzo(ghi)perylene	191-24-2	1.1	NSV	119	NSV	NSV	1.1
Benzo(k)fluoranthene	207-08-9	1.1	NSV	148	NSV	NSV	1.1
Benzoic acid	65-85-0	NSV	NSV	NSV	NSV	NSV	NSV
bis(2-Ethylhexyl)phthalate	117-81-7	NSV	NSV	0.925	NSV	NSV	0.925
Carbazole	86-74-8	NSV	NSV	NSV	NSV	NSV	NSV
Chrysene	218-01-9	1.1	NSV	4.73	NSV	NSV	1.1
Dibenz(a,h)anthracene	53-73-3	1.1	NSV	18.4	NSV	NSV	1.1
Dibenzofuran	132-64-9	NSV	NSV	NSV	NSV	NSV	NSV
Di-n-butyl phthalate	84-74-2	NSV	200	0.15	NSV	200	200
Fluoranthene	206-44-0	1.1	NSV	122	NSV	NSV	1.1
Fluorene	86-73-7	1.1	NSV	122	30	NSV	1.1
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	NSV	109	NSV	NSV	1.1
Methylnaphthalene, 2-	91-57-6	29	NSV	3.24	NSV	NSV	3.24
Naphthalene	91-20-3	29	NSV	0.0994	NSV	NSV	29
Nitroaniline, 3-	99-09-2	NSV	NSV	3.16	NSV	NSV	3.16
Phenanthrene	85-01-8	29	NSV	45.7	NSV	NSV	29
Pyrene	129-00-0	1.1	NSV	78.5	NSV	NSV	1.1
Volatile Organic Compounds							

Appendix B

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Acetone	67-64-1	NSV	NSV	2.5	NSV	NSV	2.5
Benzene	71-43-2	NSV	NSV	0.255	NSV	NSV	0.255
Bromomethane	74-83-9	NSV	NSV	0.235	NSV	NSV	0.235
Butanone, 2-	78-93-3	NSV	NSV	89.6	NSV	NSV	89.6
Carbon disulfide	75-15-0	NSV	NSV	0.0941	NSV	NSV	0.0941
Dichloroethane, 1,1-	75-34-3	NSV	NSV	20.1	NSV	NSV	20.1
Dichloroethene, 1,1-	75-35-4	NSV	NSV	8.28	NSV	NSV	8.28
Dichloroethene, cis-1,2-	156-59-2	NSV	NSV	0.784 [h]	NSV	NSV	0.784
Methylene chloride	75-09-2	NSV	NSV	4.05	NSV	NSV	4.05
Toluene	108-88-3	NSV	200	5.45	NSV	200	200
Trichloroethane, 1,1,1-	79-00-5	NSV	NSV	29.8	NSV	NSV	29.8
Trichloroethene	79-01-6	NSV	NSV	12.4	NSV	NSV	12.4
Trimethylbenzene, 1,2,4-	95-63-6	NSV	NSV	NSV	NSV	NSV	NSV
Xylene, Total	1330-20-7	NSV	NSV	10	NSV	NSV	10

EPA - U.S. Environmental Protection Agency.
ESV - Ecological screening value.
NSV - No screening value available.
mg/kg - Milligrams per kilogram.

Priority for Selection of ESVs:
1) EPA Eco-SSL
2) PRG for Eco Endpoints, (Efroymson, et.al, 1997a)
3) EPA Region 5 Ecological Screening Levels
4) Efroymson, 1997b
5) Efroymson, 1997c

[a] EPA, 2008, Ecological Soil Screening Level (SSL) guidance. On-line at: http://www.epa.gov/ecotox/ecossl/index.htm
[b] Efroymson, 1997a, *Preliminary Remediation Goals for Ecological Endpoints*. www.esd.ornl.gov/programs/ecorisk/documents/tm162r2.pdf .
[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level (ESL)*, Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm
[d] Efroymson, R.A., M.E. Will, G.W. Suter, 1997b, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision, ES/ER/TM-126/R2 (microbial screening values are not included). http://www.esd.ornl.gov/programs/ecorisk/documents/tm126r21.pdf.
[e] Efroymson, R.A., M.E. Will, G.W. Suter, 1997c, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision, ES/ER/TM-85/R3. http://www.esd.ornl.gov/programs/ecorisk/documents/tm85r3.pdf
[f] Based on the screening value for total PCBs.
[g] Based on the screening value for DDT and metabolites.
[h] Based on the screening value for dichloroethylene [trans-1,2].
[i] Based on the screening value for 2,6-dinitrotoluene.

RESPONSE TO COMMENTS

Responses to Ohio Environmental Protection Agency Comments on the Draft Baseline Human Health Risk Assessment and Screening-Level Ecological Risk Assessment for Ash Pit No. 1 Addendum for Coal Yard No. 1 Former Plum Brook Ordnance Works, Sandusky, Ohio, Dated May 7, 2013

Comments by Janusz Byczkowski, Risk Assessor, Ohio Environmental Protection Agency, received June 27, 2013.

BHHRA Comments

Comment 1: **Section ES-1, Line 6. The BHHRA document states:** ***"…consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions and agreements between the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville…"***

The issue of determining background and the "agreement" was already discussed in previous reviews. Please note that no legally binding agreement has been made between OEPA and ACE or Shaw Environmental Inc., regarding risk assessment methodology at the NASA Plum Brook Site. Please delete reference to "agreements" with Ohio Environmental Protection Agency.

Response 1: The words "and agreements" will be removed from the indicated text.

BHHRA and SLERA Comments

Comment 2: **BHHRA Section 2.2, P. 2-1, L#22, Tabl. 2-3 and SLERA Section 2.2.1, P. 2-3, L#25, Tabl 2-2. The BHHRA document states: *"…surface soil is defined as samples collected within the interval of 0 to 1 foot below ground surface…"*. The SLERA document states *"…For ecological impact, soil from 0 to 6 feet below ground surface (bgs) was used…"*. Yet in both, BHHRA Table 2-3 and SLERA Table 2-2, concentrations are listed as "in Surface Soil".**

Using different intervals bgs under the same term "Surface Soil" may be confusing and deserves an explanation at the footnote of each table presenting the soil data. The exact depth of samples is further complicated by statement in BHHRA page 2-1: *"…surface soil samples were collected immediately below a layer of fill rock that was used as the base for coal storage; this layer was found to be 0.3 to 1 foot thick…"*

Response 2: The title of Table 2-2 in the SLERA will be changed to "*Statistical Summary and Selection of Chemicals of Potential Concern in ~~Surface Soil~~ Soil (0 to 6 feet bgs)*".

APPENDIX G

ASH PIT NO. 1 AND ASH PIT NO. 3 SCR FOR COAL YARD NO. 3 SOIL AND ASH PIT NO. 3 GROUNDWATER

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Final
October 2012

Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps of Engineers
Nashville District

FUDS Project No. G05OH001821

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Final
October 2012

Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

FUDS Project No.
G05OH001821

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October 18, 2012

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Kathy McClanahan)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Submittal of the Final Ash Pit No. 1 and Ash Pit No. 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013, Shaw is pleased to submit this Final Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio.

Enclosed are four copies of this final report. Copies have also been sent to those on the distribution list, as indicated. As requested, the document was sent to the Center of Expertise and RAB in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven T. Downey, PE, PMP
Project Manager

Enclosures

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DISCIPLINE SIGN-OFF REVIEW

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 1 and Ash Pit No. 3 Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013 Delivery Order No. DX02

Project No. 132457 Task/Phase Number: 41000000

Document Type	Identify specific section or segment covered by this checkprint	Document Origin
☐ Technical / Cost Proposal		X Originator Developed
☐ RFP		☐ Edited Standard
☐ Contract / Subcontract		☐ Client Furnished
☐ Work Plans		
X Report	Site Characterization Report Addendum	**Document Status**
☐ Risk Assessment / Evaluation		☐ Preliminary
☐ Specifications & Plans		☐ Internal Draft
☐ Design Calculations		☐ Draft
☐ Tables		☐ Draft Final
☐ Drawings / Figures		X Final
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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 1 and Ash Pit No. 3
Site Characterization Report Addendum for
Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Prepared for:

Commander
U.S. Army Engineer District, Nashville
Post Office Box 1070
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October 2012

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List of Acronyms

bgs	below ground surface
BHRRA	baseline human health risk assessment
BSC	background screening concentration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DNT	dinitrotoluene
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
IDW	investigation-derived waste
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NASA	National Aeronautics and Space Administration
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PCB	polychlorinated biphenyl
PETN	pentolite
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RBSC	risk-based screening concentration
SCR	site characterization report
Shaw	Shaw Environmental and Infrastructure, Inc.
SLERA	screening level ecological risk assessment
SWSAP	site-wide sampling and analysis plan
SWSHP	site-wide safety and health plan
SVOC	semivolatile organic compound
TAL	target analyte list
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
USACE	U.S. Army Corps of Engineers

Executive Summary

The U.S. Army Corps of Engineers is investigating the former Plum Brook Ordnance Works (PBOW) in Sandusky, Erie County, Ohio, under the Defense Environmental Restoration Program's Formerly Used Defense Sites authorization and funding. The PBOW site was used for the manufacture of explosives during World War II. The former PBOW site is currently operated and maintained by the National Aeronautics and Space Administration as Plum Brook Station, an active testing and research installation associated with the John H. Glenn Research Center of Cleveland, Ohio. The U.S. Army Corps of Engineers contracted Shaw Environmental and Infrastructure, Inc. (Shaw) to conduct an addendum to the existing Ash Pit No. 1 and Ash Pit No. 3 site characterization report (SCR) documenting soil conditions of the Ash Pit No. 1 associated coal yard (Coal Yard No. 1). The specific investigation site is located immediately adjacent to (west) of Powerhouse No. 1, which is located in the central portion of PBOW.

During PBOW explosives manufacturing operations from 1941 to 1945, three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were present to support the nitroaromatic manufacturing process. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas to provide coal for use in the powerhouse boilers. The coal was brought into the yards via train. All stockpiled coal has been removed, but the removal date is not known. Chemical contamination (increase of inorganic compounds) of the soil resulting from the leaching of precipitation through the coal stored in Coal Yard No. 1 is expected to consist primarily of semivolatile organic compounds (SVOC) and target analyte list (TAL) metals or inorganic compounds, although nitroaromatics and volatile organic compounds could be possible.

The SCR for Ash Pit No. 1 and Ash Pit No. 3 was submitted as a final report in November 2010. This addendum details remedial investigation activities for Coal Yard No. 1 and includes soil sample collection, analytical results, and recommendations. This document is one of two planned reports. The remaining report will consist of a remedial investigation summary report and will be submitted under separate cover. The remedial investigation summary report will include information from the

Ash Pit No. 1 and Ash Pit No. 3 site characterization reports including this addendum as well as the baseline human health risk assessments and the screening-level ecological risk assessments that have been prepared for each site.

Activities for investigation of the Coal Yard No. 1 were initiated based upon review of 2009 groundwater analytical data from overburden/shale monitoring well AP1-MW01, located downgradient of Coal Yard No. 1. Manganese and iron concentrations exceeded both risk-based screening levels (RBSC) and background screening levels (BSC) in this monitoring well. Reasons for exceedance of manganese and iron were unclear, although based upon the location of the piezometer and monitoring well and groundwater flow direction, a potential upgradient source (Coal Yard No. 1) appeared likely.

No previous investigations at Coal Yard No. 1 have been conducted.

Remedial investigation activities were conducted by Shaw for Coal Yard No. 1 in December 2011. Field activities included hand auger operation with soil sampling, soil borehole lithologic logging, paperwork completion, surveying, and disposal of investigation-derived waste.

Four soil boring locations were chosen to provide adequate coverage of the coal yards based upon field observations of surface and subsurface coal in the former coal yard area. During field reconnaissance, a pickax was used to dig shallow excavations to determine the presence of coal and the coal thickness. From each boring location, soil samples were collected from three distinct intervals to provide evidence of possible soil contamination. Surface soil samples were collected from soil immediately below the coal material. Subsurface soil samples were collected from 3 to 5 feet and 8 to 10 feet below the existing ground surface. Each soil sample from the selected interval was transferred to a new resealable plastic bag and homogenized. Soil was analyzed for nitroaromatics, SVOCs, and TAL metals. Soil from the 0 to 1 and 3 to 5-feet intervals were also analyzed for polychlorinated biphenyls. Soil sampling was completed on December 20, 2011.

Analytical results from the various media collected were compared to RBSCs derived from November 2011 U.S. Environmental Protection Agency regional screening levels for a residential land-use scenario. These screening levels were used as points of comparison in this SCR addendum. Site contaminants will be further evaluated in risk assessments. In addition, the analytical results for the metals in the 2011 soil samples were compared to soil BSCs.

Significant conclusions from the surface and subsurface soil analytical results are as follows:

- No nitroaromatics or polychlorinated biphenyls were detected in surface or subsurface soil samples.
- No SVOC analytes were detected above the RBSCs in any surface or subsurface soil sample.
- No TAL metals were detected above both the RBSC and BSC values in surface soil samples.
- Only one TAL metal (thallium) was detected at a concentration above both the RBSC and BSC value in subsurface soil samples. However, this result, detected at the 3- to 5-foot interval of a quality assurance sample (i.e., the field split analyzed by an independent lab) at a concentration (1.5 milligrams per kilogram [mg/kg]) slightly above the BSC (1.3 mg/kg), is questionable because thallium was not detected in the associated quality control sample and thallium was detected at a concentration (0.41 mg/kg) that was less than one-third the BSC in the regular sample. Note that the quality control sample is a field duplicate sample analyzed by the same lab as the regular field sample.
- Total organic carbon was measured in the surface soil at a concentration of 0.27 mg/kg.

Conclusion. The surface and subsurface soil of Coal Yard No. 1 appears to be adequately characterized. A baseline human health risk assessment is not needed because all analytes would be screened out, leaving no chemicals of potential concern for evaluation. Ecological risks will be discussed in the remedial investigation report, which will describe that based on low concentrations of analytes in Coal Yard No. 2, no screening-level ecological risk assessment is required. Recommendations of the SCR will be included in a remedial investigation report, submitted under separate cover.

1.0 Introduction

The U.S. Army is conducting studies of the environmental impact of suspected waste sites at previously owned U.S. Department of Defense properties. The former Plum Brook Ordnance Works (PBOW) is located in Sandusky, Erie County, Ohio (Figure 1-1). PBOW is being investigated under the Defense Environmental Restoration Program for Formerly Used Defense Sites. The investigation is being managed and technically overseen by the Nashville, Tennessee, and Huntington, West Virginia, District Offices of the U.S. Army Corps of Engineers (USACE). This 9,000-acre facility was used for the manufacture of explosives during World War II. The site is currently controlled and maintained by the National Aeronautics and Space Administration (NASA) and is operated as the Plum Brook Station (PBS) of the John H. Glenn Research Center at Lewis Field.

Fieldwork and reporting for Ash Pit No. 1 Coal Yard (Coal Yard No. 1) was performed under Delivery Order DX02 for the USACE Louisville Architecture/Engineering Environmental Services Indefinite Delivery/Indefinite Quantity, Contract Number W912DR-08-D-0013. The site characterization report (SCR) for Ash Pit No. 1 and Ash Pit No. 3 was submitted as a final report in November 2010. This addendum details remedial investigation activities for Coal Yard No. 1 and includes soil sample collection, analytical results, and recommendations.

During a previous investigation, an overburden/shale groundwater monitoring well (AP1-MW01) was installed upgradient of Ash Pit No. 1. Groundwater samples from that well indicated elevated manganese and iron in the groundwater. Manganese was present in both the filtered (32,100 micrograms per liter [µg/L]) and unfiltered (32,300 µg/L) groundwater samples, exceeding the risk-based screening concentration (RBSC) limit of 88 µg/L and the background screening concentration (BSC) limit of 636 µg/L. Review of groundwater quality measurements determined the high concentrations were not a result of elevated turbidity. In addition, the concentration of iron (4,990 µg/L) was above the RBSC limit of 2,600 µg/L and the BSC of 1,550 µg/L. Associated piezometer AP1-PZ05 also exhibited manganese concentrations above RBSC and BSC levels in both the filtered sample (3,540 µg/L) and the unfiltered sample (3,370 µg/L). Based on interpreted groundwater flow for Ash Pit No.1, a former powerhouse coal yard (Coal Yard No. 1) was located immediately upgradient of this well. Evaluation of site information suggested that leaching of the coal in the former coal yard may have impacted the groundwater. Therefore, additional soil sampling was recommended to evaluate the former PBOW coal yard as a potential source of contamination.

The field activities completed by Shaw Environmental and Infrastructure. Inc. (Shaw) for investigation of Coal Yard No. 1 were conducted pursuant to the following documents:

- Site-wide accident prevention plan/site-wide health and safety plan (SWSHP) (Shaw, 2008a)
- Site-wide sampling and analysis plan (SWSAP) (Shaw, 2008b)
- Site-wide quality assurance project plan (QAPP) (Shaw, 2008c).
- Site-specific sampling and analysis plan (Shaw, 2011a).

1.1 Scope of Work and Project Objectives

The scope of this SCR addendum (USACE, 2011) includes updating the existing quality control plan, adding site-specific addenda to the SWSHP and SWSAP, soil sampling, installation and sampling of monitoring wells, surveying, laboratory analysis, and investigation-derived waste (IDW) management and disposal. Figure 1-2 identifies the location of Coal Yard No. 1 in relation to other areas of concern and site features.

The objectives of this investigation to address data gaps in soil samples include the following:

- Conduct soil sampling and lithologic logging
- Conduct laboratory analysis of soil
- Management and disposal of IDW
- Submit an SCR addendum
- Update the baseline human health risk assessment (BHHRA) and screening-level ecological risk assessments (SLERA)
- Prepare and submit a geographic information system deliverable.

This document is one of two planned reports. The remaining report will be the remedial investigation report and will summarize the findings of the following documents:

- Ash Pit No. 1
  - Coal Yard No. 1 SCR Addendum
  - Ash Pit No. 1 SCR

- Ash Pit No. 1 BHHRA
- Ash Pit No. 1 SLERA

- Ash Pit No. 3
  - Coal Yard No. 3 SCR Addendum
  - Ash Pit No. 3 SCR
  - Ash Pit No. 3 BHHRA
  - Ash Pit No. 3 SLERA.

The remedial investigation report is planned to be issued in 2013.

1.2 Report Organization

Chapter 2.0 of this report describes PBOW and the Coal Yard No. 1 site, its physical setting, geology, and hydrogeology features. Sampling strategy and field procedures are described in Chapter 3.0. The analytical program and background comparison data are presented in Chapter 4.0. Chapter 5.0 describes specific-site information and historical and current analytical data. Chapter 6.0 presents media conclusions. Recommendations are provided in Chapter 7.0. References that were used in preparing the report are listed in Chapter 8.0.

Sample collection logs, soil boring logs, and land survey data are provided in Appendices A, B, and C, respectively. An IDW manifest is included in Appendix D. Appendices E through H contain analytical data pertinent to the soil sampling event. Appendix I contains the chains of custody for laboratory analysis.

1.3 Facility Location and Description

The former PBOW site is currently utilized and maintained by NASA and is operated as the PBS, a satellite office of the NASA John H. Glenn Research Center, located at Lewis Field in Cleveland, Ohio. Most of the aerospace testing facilities built at the site in the 1960s are on standby or inactive status. The site is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland. Although primarily in Perkins and Oxford Townships, the eastern edge of the site extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The PBOW facility is currently surrounded by a chain-link fence, and the perimeter is patrolled regularly. Access by authorized personnel is limited to established checkpoints. Public access is restricted except during the annual controlled deer hunting season.

1.4 PBOW Site History

The PBOW site was built in early 1941 and manufactured 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite (PETN). Production of explosives began in December 1941 and continued until 1945. During operation, three areas (TNT Area A [TNTA], TNT Area B [TNTB], and TNT Area C [TNTC]) manufactured TNT and DNT and one area manufactured PETN. TNTA consisted of manufacturing lines 1 through 4, TNTB consisted of lines 5 through 7, and TNTC consisted of lines 8 through 12. TNTA is located on the northeast side of PBOW, TNTB is located at the south-central part, and TNTC is located at the southwestern side of PBOW. The PETN manufacturing area is located in the north-central portion of PBOW and lies within the boundaries of Ransom Road on the west, Pentolite Road on the south, and Patrol Road on the north and east. The central portion of the former PETN manufacturing area was occupied by NASA's nuclear reactor, which was decommissioned in 2012 with all aboveground structures demolished and removed from the site.

It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. After the plant was shut down, decontamination of TNT, acid, PETN, and DNT processing lines began. Decontamination was considered complete during the last quarter of 1945. The property was initially transferred to the Ordnance Department after it was certified by the Army to be decontaminated in 1946. This transfer did not include the 2,800 acres comprising the Plum Brook area. The War Assets Administration accepted custody of the remaining acreage (approximately 3,230 acres) in 1946. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts during the 1950s through 1963.

Two property use agreements were entered into by the National Advisory Committee of Aeronautics, the predecessor of NASA, and the Army in 1956 and 1958. On March 15, 1963, accountability for and custody of the entire PBOW property (6,030 acres) was transferred to NASA by the Department of the Army. NASA performed further decontamination during 1964. The NASA decontamination process was accomplished in five steps (Dames and Moore, Inc., 1997a):

1. Inspecting and removing contaminated surface soil above the drain tiles, flumes, etc.

2. Spot checking of subsurface soil in the vicinity of drain tiles, flumes, etc., to determine where the contaminated tiles and flumes were located. Where contamination was found, the flumes, tiles, etc., were removed in sections.

3. Removal of some items previously decontaminated to Level 3X (XXX-military decontamination level established primarily for worker safety that indicates potentially contaminated material or previously contaminated material that has been decontaminated to a zero residual contamination level) condition to a storage facility and additional decontamination of the remainder of the items to a 5X (XXXXX – level that indicates a decontaminated material with no detectable residual contamination) condition in order to be sold ("X" indicates the Army's specific decontamination level).

4. Destruction of all buildings by fire followed by removal of all debris and concrete foundations. All the materials, including the earth, in those areas was flashed and the area was then rough graded.

5. Decontamination of all sump basins and removal of the concrete.

The decontamination process also included burning of nitroaromatic-filled flumes that were excavated. As shown in the records review (Dames & Moore, Inc., 1997b) this was performed on July 10, 1963, near the intersection of Fox Road and Snake Road and is suspected to have also occurred at the Additional Burning Ground area.

On April 18, 1978, NASA declared approximately 2,152 acres of land as excess. This excess acreage included former buffer areas that were not formerly used by the Army and were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess for use as a bus transportation center. The General Services Administration retains the remaining acreage and currently has a use agreement with the Ohio National Guard for 604 acres of the land. NASA presently controls about 6,400 acres and is using the site to conduct space research as a satellite operation of the John H. Glenn Research Center based in Cleveland, Ohio. The details of these land transactions are listed in the site management plan (International Consultants Incorporated, 1995) and can be found at NASA PBS.

1.5 Coal Yard No. 1 Site History

As noted in Section 1.4, PBOW was built in early 1941 and manufactured acid, 2,4,6-TNT, DNT, and pentolite until 1945. Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several

steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas providing coal to be used in the powerhouse's boilers. The coal was brought into the yards via train. Figure 1-2 shows the location of Coal Yard No. 1 on PBOW property.

Former Coal Yard No. 1 is located immediately to the west of Powerhouse No. 1. The historical former coal yard is estimated to have been approximately 350 feet wide by 210 feet in length (approximately 1.7 acres). Half of the Powerhouse No. 1 building was demolished and the other half was remodeled and is currently being used as a storage/shop building and power supply hub station by NASA. The former coal yard is currently covered with grass and brush vegetation. A thin layer of coal was observed on the ground surface in isolated areas and along the northern perimeter during previous site walks. Figure 1-3 shows a historical photograph of the coal yard along with the associated powerhouse and two aboveground fuel oil storage tanks.

No previous environmental investigation has been conducted at Coal Yard No. 1.

2.0 Physical Setting

Figure 2-1 shows the specific site location and general Coal Yard No. 1 features with ground surface topography. Descriptions and information regarding the local geography, topography, surface drainage, regional and local geology and hydrogeology characteristics, and precipitation influence effects on local water levels have been prepared and are included in the final Ash Pit No. 1 and Ash Pit No. 3 SCR (Shaw, 2010).

During the field investigation, the majority of the former Coal Yard No. 1 area was observed to be overgrown with sparsely spaced brush, with the southern perimeter covered with young trees and brush. The majority of former Coal Yard No. 1 area is fairly level, with the outer 20 feet of the southern, western, and northern portions gently dipping in a radial pattern. Surface water runoff percolates into and through the thin residual layer of coal at the coal yard. Surface water runoff on the southern and western portions drains into the unnamed tributary located to the west, while surface water on the northern section drains into the former Ash Pit No. 1.

3.0 Field Activities

3.1 Introduction

Field activities at Coal Yard No. 1 were performed in accordance with the updated and revised SWSAP (Shaw, 2008b) and site-specific sampling and analysis plan (Shaw, 2011a), as noted in Chapter 1.0. Activities included hand auger operation with soil sampling, soil borehole logging, documentation of field work activities (sample collection logs, daily field notes, etc.), surveying, and disposal of IDW.

Prior to any intrusive work, a NASA authorized dig permit was obtained for Coal Yard No. 1. The dig permit process included review of utility maps for any underground utilities, including storm water, sewer, electrical, natural gas, telephone, cable, or fiber optic lines in the area.

3.2 Soil Sampling

In November 2011 (prior to soil sampling), the upper foot of surface soil was removed with a pickax at select locations throughout the former coal yard area to determine optimal placement for the soil borings. Removal of the surface soil aided in determining both the boundary of the former coal yard and the thicknesses of any remaining coal. Soil boring locations were chosen based on the interpreted extent of the former coal yard. Four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed at Coal Yard No. 1 using either a 2-inch or 3-inch stainless-steel hand auger. Soil collected from a sample interval was transferred to a new, resealable storage bag, thoroughly homogenized, and placed into the appropriate sample container. All hand auger activities were conducted by Shaw personnel on December 20, 2011. Figure 2-1 shows the location of the soil borings.

Three soil samples were collected from each soil boring. A surface soil sample was collected from each boring with depths ranging between 0.3 to 1.3 and 1 to 2 feet, depending on the presence and thickness of coal. Two subsurface soil samples from depths of 3 to 5 and 8 to 10 feet below ground surface (bgs) were also collected from each boring and analyzed for nitroaromatics, semivolatile organic compounds (SVOC), and target analyte list (TAL) metals. Also, the surface soil sample and shallower subsurface soil sample (3 to 5 feet) were analyzed for polychlorinated biphenyls (PCB). One of the surface soil samples was analyzed for total organic carbon. Table 3-1 presents a summary of soil samples collected, and soil sample collection logs are included in Appendix A. Continuous lithologic logs were recorded for all soil

borings during the drilling. Hazardous, toxic, and radiological waste drilling logs for each borehole are included in Appendix B.

Each borehole was abandoned after all soil sampling activities at Coal Yard No. 1 were complete. Bentonite granules were emptied into the 10-foot-deep borehole and brought to a depth of approximately 3 feet bgs. Remaining borehole soil from initial hand auger operations was emptied back into the open borehole portion and brought to ground surface.

3.3 Decontamination Procedures

Decontamination of the hand auger and sampling equipment was performed in accordance with Section 5.0 of the SWSAP (Shaw, 2008b). Specifically, sampling equipment was decontaminated by rinsing in sequence with phosphate-free soapy water, tap water, nitric acid, methanol, hexane, and deionized water. The bucket augers were decontaminated prior to each boring.

3.4 Land Survey

After initial site reconnaissance and selection of soil sampling locations (November 2011), an Ohio-registered professional land surveyor surveyed the soil boring locations. Surveying was conducted prior to actual sampling because surveying was being conducted at another PBOW site (Acid Area No. 1) to reduce mobilization and reporting costs. Horizontal coordinates were surveyed to the closest 0.1 foot and referenced to the Ohio State Plane Coordinate System. The land surface elevation was surveyed to the nearest 0.01 foot and referenced to the 1929 National Geodetic Vertical Datum. Land survey data reports are included in Appendix C.

3.5 Investigation-Derived Waste Management

IDW generated during investigation activities included decontamination water and personal protective equipment. All IDW was managed and handled in accordance with procedures described in the SWSAP (Shaw, 2008b).

All decontamination fluids generated during field activities, except the nitric acid, methanol, and hexane rinse, were stored in a labeled 55-gallon drum. Decontamination fluids (nitric acid, methanol, and hexane) were collected in a stainless-steel pan and evaporated to prevent disposal as a hazardous waste liquid. IDW rinse water was drummed and sampled to determine if it should be classified as a hazardous or nonhazardous material. Soil generated during hand auger operations was placed back into the borehole. Personal protective equipment (Tyvek® suits, latex

gloves, etc.) and general refuse were double bagged and disposed in an on-site, Shaw contracted industrial dumpster.

Following analytical determination that the wastewater was nonhazardous, on January 26, 2012, the IDW decontamination water was transported by Triad Transport, Inc. to the Environmental Quality Company in Detroit, Michigan, for disposal. The waste manifest for disposal of the decontamination fluid is shown in Appendix D.

4.0 Analytical Program

The following sections present the analytical program used in this investigation. This review includes the laboratories used for all samples, the analytical methods used, data quality evaluation, and blank analysis. In addition, a description and derivation of RBSCs is presented in Section 4.2.1. The derivation and use of BSCs and the analytical results are presented in Section 4.2.2.

4.1 Analytical Program and Methodologies

4.1.1 Sample Analysis and Data Validation

Primary and quality control (QC) project samples collected in December 2011 were analyzed by Accutest Laboratories of Orlando, Florida. Quality assurance (QA) samples were analyzed by Test America, Inc., Canton, Ohio. Analysis for nitroaromatic field split samples was performed by Test America of Sacramento, California. Shaw performed the data validation. The validation summaries are provided in Appendix E. The analytical results are summarized in Appendix F. Tables of detected hits (Section 4.1.4) data are included in Appendix G. A data quality evaluation is located in Appendix H, and chains of custody used for soil and IDW samples are included in Appendix I.

All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004), the QAPP (Shaw, 2008c), and specific analytical method requirements. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness, and comparability goals established to meet the project data quality objectives (DQO). The criteria for blank evaluation were based on those detailed in *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses* (EPA, 1994) and *Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (EPA, 1993).

4.1.2 Analytical Methods

Chemical analyses for the investigation were performed in accordance with guidelines detailed in EPA's *Test Methods for Evaluating Solid Waste (SW-846), Physical/Chemical Methods,* Third Edition, September 1986 (EPA, 1986) and subsequent revisions. The soil samples and associated QA/QC samples were analyzed for PCBs, SVOCs, nitroaromatics, and TAL metals. Methods used for analysis are summarized in Table 4-1.

4.1.3 Data Quality Evaluation

The reliability of the sampling and analytical procedures used during the investigation was demonstrated by implementing the project-specific QA procedures specified in the SWSAP (Shaw, 2008b) and the QAPP (Shaw, 2008c) and its site-specific attachments. Successful execution of these procedures provides strong supporting evidence that the data are representative of the areas under investigation.

The DQOs for this project were to produce scientifically valid data of known accuracy and precision that were complete with respect to identified critical samples, comparable with similar data types, and representative of the media sampled so as to be useful for the cited purposes. Evaluation of the data using the DQOs and the data validation process resulted in the determination that the data set is valid and of sufficient quality to meet the objectives of the investigation.

A complete evaluation of the analytical results is given in the data quality evaluation found in Appendix H.

4.1.4 Blank Evaluation

The purpose of blank analysis is to detect contamination resulting from laboratory and field activities. For this site, field blanks were not required. Only laboratory method blanks were analyzed. Blank evaluation involves qualification of data based on the results of the laboratory method blanks. The criteria for blank evaluation are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified "B."

- For inorganics, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."
- If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, no action is taken.

In instances where more than one blank is associated with a given sample, qualification is based upon a comparison with the associated blank having the highest concentration of a contaminant. Blank results are not subtracted from sample concentrations. Note that data with “B” validation qualifiers are included in the Chapter 5.0 tables, but the associated concentrations are not included in the tables’ “maximum detected concentration” column because “B” qualified data are not regarded as detected and are not used in PBOW risk assessments.

4.2 Comparison to Screening Criteria

The analytical result tables presented in Chapter 5.0 include a comparison to RBSCs and BSCs as points of reference only. Concentrations of analytes that exceed the RBSCs are highlighted in the tables. RBSCs do not infer a regulatory limit or mandated cleanup level, nor is the identification of an exceedance intended to indicate an unacceptable human health risk or a need for remedial action. Formal evaluation of human health risks will be performed in the BHHRA. Concentrations in individual samples that exceed the respective BSCs are identified in bold type in the Chapter 5.0 result table.

4.2.1 Risk-Based Screening Concentrations

The RBSCs are derived from November 2011 regional screening levels (EPA, 2011) using the methodology described in the Ash Pit No. 1 BHHRA work plan (Shaw, 20011b). Because the area surrounding PBOW is agricultural and residential and because other PBOW sites have been remediated based on unrestricted land use, risk-based screening has been performed based on residential exposure. This assumption is appropriate because the area surrounding the former PBOW facility is rural and residential, and if/when the property is excessed, the land will likely become residential. Soil RBSCs are based on a long-term residential land-use scenario that assumes use by a young child for noncancer effects and use by the combined young child and adult life stages for carcinogenic effects. Together, these capture a plausible case for future land use. The soil RBSCs are based on an incremental lifetime cancer risk of 1E-6 and a hazard quotient of 0.1. As stated in Section 4.2, laboratory analytical results are compared to RBSCs only as a point of reference. Further details on the RBSCs and their derivation are provided in the BHHRA work plan.

4.2.2 Background Screening Concentrations

Derivation and BSC values for PBOW soil are presented in the acid areas site investigation report (IT Corporation, 1998). Table 4-2 presents a complete list for metals in soil. The BSCs were derived from concentrations of these analytes found in PBOW background groundwater monitoring wells and soil data sets. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Each BSC is the calculated 95th percent upper tolerance limit or the maximum detected concentration of the background data set, whichever value is lower, for each relevant analyte (IT Corporation, 1998). It is noted that the method agreed upon for the development of BSCs by OEPA and USACE, as recorded in the September 11, 2002 PBOW team meeting minutes, differs from that shown in current OEPA (2009) guidance. This PBOW team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2009) guidance.

5.0 Investigation Results

On December 20, 2011, four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed within Coal Yard No. 1. Surface soil samples were collected from depths of approximately 0.3 to 1.3, 0.5 to 1.5, or 1 to 2 feet bgs due to the presence of coal on the ground surface, 3 to 5 feet bgs, and 8 to 10 feet bgs. Findings of the soil sampling are discussed in the following sections. Analytical results and conclusions are presented in the following sections.

5.1 Site-Specific Soils

As described in the Ash Pit No. 1 SCR (Shaw, 2010), fill sand had been used at PBOW following demolition and early remediation tasks to cover concrete foundations and demolition scars and to promote a natural landscape appearance. At Coal Yard No. 1, no fill sand of this type was encountered on the surface at any of the four soil borings drilled. The ground surface at two of the four soil borings (CY1-SB01 and CY1-SB03) was covered with a mixture of black sand, silt, and coal to a depth of approximately 0.5 foot. A sand, silt, and coal mixture was slightly less at boring CY1-SB02 with a thickness of only 0.3 foot. At the fourth boring (CY1-SB04), the first 1 foot of surface soil consisted of a mixture of black silt with clay, coal, and sand. Figure 2-1 shows a Coal Yard No. 1 site map with soil boring locations.

Below the silt, clay, sand, and coal surface soil, a layer of yellowish-brown, very fine-grain sand with silt of loose consistency was typically encountered to a depth ranging from 3 to 4 feet. This material could be fill material based upon the depth and uniqueness of a fine-grain sand-silt near the surface. Cinders were encountered in boring CY1-SB01 at a depth of 4 to 6 feet bgs, below the fine-grain sand and silt. A historical photograph dated January 19, 1942 shows that a parking area was present prior to the existence of Coal Yard No. 1. It is possible that this sand with silt was the former parking area, was possibly the base for either the parking area or coal storage, or was used to level the ground surface during construction of the powerhouse.

Native soil is believed to have been encountered in the borings at depths ranging from 3 feet in borings CY1-SB01, CY1-SB03 and CY1-SB04 to 6 feet bgs in boring CY1-SB02. Native soil consisted of glacial till, glacial outwash, or possibly a glacial lacustrine (lake) deposit. In three of the four soil borings (CY1-SB01, CY1-SB03, and CY1-SB04), typically a stiff silt with clay or clay with silt was encountered to the total boring depth of 10 feet. The color of the silt or clay was usually gray except in boring CY1-SB02, where it was an olive brown which gradually changed to a dark yellowish brown at a depth of approximately 8 feet. Depth to groundwater

varied from 0.5 foot bgs in CY1-SB01 to 1.5 feet bgs in boring CY1-SB02, and groundwater was not encountered in the remaining two borings (CY1-SB03 and CY1-SB04).

5.2 Soil Analytical Results

A total of 14 soil samples were collected from the four borings. Four surface soil samples and 10 subsurface samples (including 1 QC and 1 QA sample) were collected from depths of 3 to 5 and 8 to 10 feet bgs. Three of the surface soil samples were collected below a nearly 0.5-foot-thick coal layer while the remaining surface soil sample, CY0012, was collected below a coal layer beginning at a depth of 1 foot bgs. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. Also, the surface soil samples and the 3 to 5 feet bgs interval soil samples were analyzed for PCBs. Table 5-1 summarizes detected concentrations of analytes and compares these concentrations to the RBSCs and/or BSCs.

5.2.1 2011 Surface Soil Samples

No nitroaromatics or PCBs were detected in any of the surface soil samples at Coal Yard No. 1. Five SVOCs (fluoranthene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene) were detected in the surface soil sample from boring CY1-SB04 and only one SVOC (2-methylnaphthalene) was detected in boring CY1-SB03, but all were far below their respective RBSCs.

No TAL metal analytical concentrations exceeded both the RBSC and BSC limits in surface soil samples at Coal Yard No. 1.

Total organic carbon was measured in the surface soil at a concentration of 0.27 milligrams per kilogram (mg/kg).

5.2.2 2011 Subsurface Soil Samples

No nitroaromatics or PCBs were detected in the subsurface soil samples at Coal Yard No. 1. The SVOCs dibenzofuran, fluoranthene, fluorene, and pyrene were detected in the 3 to 5 feet bgs subsurface soil sample CY0005 from boring CY1-SB02 and the SVOCs 2-methylnaphthalene, naphthalene, and phenanthrene were detected in the QA (field split) sample CY0010 from boring CY1-SB03. All results were below the respective RBSCs.

Only one TAL metal, thallium, was detected above both the RBSC and BSC. Thallium was found in the 3 to 5 feet subsurface soil sample CY0010 (QA sample) from boring CY1-SB03 at a concentration of 1.5 mg/kg, slightly greater than the RBSC of 0.078 mg/kg and BSC value of 1.3 mg/kg.

6.0 Summary and Conclusions

To determine possible contamination to soil caused by the storage of coal, four soil borings (CY1-SB01, CY1-SB02, CY1-SB03, and CY1-SB04) were completed within Coal Yard No. 1.

Field activities at Coal Yard No. 1 were conducted in November and December 2011 and included hand auger operation, soil sample collection, lithologic logging, documentation, and surveying of boring locations. Disposal of IDW occurred in January 2012. A total of 4 surface soil and 10 subsurface soil (including 1 QA and 1 QC sample) samples were collected. Surface soil samples were collected from depths of either 0.3 to 1.3, 0.5 to 1.5, or 1 to 2 feet bgs (immediately below the existing coal layer), and subsurface soil samples were collected from depths of 3 to 5 and 8 to 10 feet bgs. Soil samples were analyzed for nitroaromatics, SVOCs, and TAL metals. In addition, surface soil and 3 to 5 feet interval samples were analyzed for PCBs. Analytical results obtained from each soil sample were screened against RBSC and BSC values. RBSC values do not infer a regulatory limit or mandated cleanup level, nor does an exceedance necessarily represent an unacceptable human health risk. They are used in this report only as points of reference.

Major findings from Coal Yard No. 1 soil sample results are summarized as follows:

- No nitroaromatics or PCBs were detected in surface or subsurface soil samples.
- Only one SVOC was detected in one of the three surface soil samples (CY0007) and five SVOCs were detected in the surface soil sample (CY0012). None of the SVOCs detected were above their respective RBSCs in any surface or subsurface soil sample.
- A total of seven SVOCs were detected in 2 of the 10 subsurface soil samples, and results of each were below their respective RBSCs.
- Only one TAL metal (thallium) was detected above both the RBSC and BSC value in one subsurface soil sample. Thallium was detected at a concentration of 1.5 mg/kg in the 3- to 5-foot field split (QA) sample (CY0010) from boring CY1-SB01, marginally above the BSC (1.3 mg/kg). This exceedance is questionable because thallium was detected at a concentration (0.41 mg/kg) that is well below the BSC in the regular sample from this location (CY0008), and it was not detected in the associated field split (QC) sample (CY0009).
- Total organic carbon in the surface soil sample from boring CY1-SB01 was detected at a concentration of 0.27 mg/kg.

The soil data collected from Coal Yard No. 1 do not indicate an appreciable impact due to the former storage of coal at the site.

7.0 Recommendations

The surface and subsurface soil of Coal Yard No. 1 appears to be adequately characterized. With the exception of thallium, none of the analytes exceeded both the corresponding RBSC and the BSC values. Thallium only marginally exceeded the BSC in the field split (QA) sample from a single location and was not detected above the BSC in either the regular sample or field duplicate (QC) sample. Therefore, no BHHRA is needed because all analytes would be screened out, leaving no chemicals of potential concern for evaluation. Ecological risks will be discussed in the remedial investigation report, which will describe that based on low concentrations of analytes in Coal Yard No. 1, no screening-level ecological risk assessment is required.

Planned Activities. Completion of a remedial investigation report, which is anticipated for completion in 2013.

8.0 References

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U.S. Environmental Protection Agency (EPA), 1986, ***Test Methods for Evaluating Solid Waste (SW-846), Physical/Chemical Methods***, Third Edition, September.

TABLES

Table 3-1

Summary of Soil Samples Collected
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number
SS	CY1-SB01	CY0001	20-Dec-11	REG	F88938
DS	CY1-SB01	CY0002	20-Dec-11	REG	F88938
DS	CY1-SB01	CY0003	20-Dec-11	REG	F88938
SS	CY1-SB02	CY0004	20-Dec-11	REG	F88938
DS	CY1-SB02	CY0005	20-Dec-11	REG	F88938
DS	CY1-SB02	CY0006	20-Dec-11	REG	F88938
SS	CY1-SB03	CY0007	20-Dec-11	REG	F88938
DS	CY1-SB03	CY0008	20-Dec-11	REG	F88938
DS	CY1-SB03	CY0009	20-Dec-11	FD	F88938
DS	CY1-SB03	CY0010	20-Dec-11	FS	240-7168-1
DS	CY1-SB03	CY0011	20-Dec-11	REG	F88938
SS	CY1-SB04	CY0012	20-Dec-11	REG	F88938
DS	CY1-SB04	CY0013	20-Dec-11	REG	F88938
DS	CY1-SB04	CY0014	20-Dec-11	REG	F88938

Notes:

SDG - Sample delivery group.

SS - Surface soil.

CY1 - Coal Yard No. 1.

REG - Regular sample.

FD - Field duplicate. Sample sent to same laboratory as primary samples.

FS - Field split. Sample sent to independent laboratory other than primary contract laboratory.

DS - Deep soil (subsurface).

Table 4-1

Summary of Soil and Groundwater Analytical Parameters and Methods for Soil
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Matrix	Analytical Parameters[a]	Analytical Method[b]
Soil	TCL Semivolatile Organic Compounds	SW-846 3550C/8270D
	Nitroaromatic Compounds	SW-846 8330A
	Polychlorinated Biphenyls	SW-846 3550C/8082A
	TAL Metals	SW-846 3050B/6010C/7471B
	Total Organic Carbon	Walkley-Black
Liquid IDW	Target Compound List Volatile Organic Compound	SW-846 8260B
	Target Compound List Semivolatile Organic Compound	SW-846 3510C/8270D
	Nitroaromatics	SW-846 8330A
	Total Recoverable Metals	SW-846 3010A/6010C/7470A
	Ignitability	SW-846 1010A
	pH	SW-846 9040C
	Corrosivity	SW-846 1110A
	Reactive Cyanide	7.3.3/7.3.4
	Reactive Sulfide	7.3.3/7.3.4
Soil IDW	TCLP Volatile Organic Compounds	SW-846 1311/8260B
	TCLP Semivolatile Organic Compounds	SW-846 1311/3510C/8270C
	TCLP Metals	SW-846 1311/3010A/6010C/7470A
	Ignitability	SW-846 1010A
	Corrosivity	SW-846 1110A
	Reactivity	7.3.3.2/7.3.4.2

[a]Target analyte list (TAL) and target compound list (TCL) are used to designate parameter lists with no requirements for Contract Laboratory Program method quality control or data reporting packages.
[b]Analyses found in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* EPA Publication, Third Edition, and *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, March 1983 and subsequent revisions, except as noted.
[c]Water quality parameter.
[d]Field testing will use an appropriate field test kit or method according to EPA 600/4-79-020: Method for Chemical Analysis of Water and Wastes in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication, Third Edition.

IDW - Investigation-derived waste.
SCR - Site characterization report.
TCLP - Toxicity characteristic leaching procedure.
TOC - Total organic carbon.

Table 4-2

Background Screening Concentrations of Metals in Soil[a]
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Criterion [c]
Aluminum	12 / 12	3520 - 15500	NA	L	8.43E+03	2.69E+04	1.55E+04
Antimony	9 / 25	5.9 - 9.3	5.4 - 74	NP	4.68E+00	NA	9.30E+00
Arsenic	23 / 26	2.1 - 36.5	1.2 - 3.7	L	1.08E+01	7.10E+01	3.65E+01
Barium	9 / 12	35.6 - 826	23.2 - 24.7	L	1.16E+02	1.30E+03	8.26E+02
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00E+00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	NA	L	1.13E+04	2.18E+05	5.23E+04
Chromium	25 / 26	4.4 - 29	12.3 - 12.3	NP	1.34E+01	NA	2.90E+01
Cobalt	9 / 12	9.6 - 116	5.8 - 6.2	L	2.26E+01	2.48E+02	1.16E+02
Copper	23 / 26	2.3 - 56.2	2.2 - 2.9	L	1.70E+01	1.47E+02	5.62E+01
Iron	12 / 12	5880 - 234000	NA	L	4.01E+04	3.58E+05	2.34E+05
Lead	26 / 26	1.9 - 48.6	NA	L	1.28E+01	5.13E+01	4.86E+01
Magnesium	12 / 12	629 - 10400	NA	L	3.26E+03	3.08E+04	1.04E+04
Manganese	26 / 26	21 - 13300	NA	L	7.29E+02	3.51E+03	3.51E+03
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	8.50E-02
Nickel	26 / 26	5.4 - 55.1	NA	L	2.28E+01	7.79E+01	5.51E+01
Potassium	11 / 12	579 - 3390	617 - 617	L	1.24E+03	6.08E+03	3.39E+03
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00E+00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	1.11E+01
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30E+00
Vanadium	11 / 12	9 - 40.9	61.7 - 61.7	L	2.48E+01	8.31E+01	4.09E+01
Zinc	26 / 26	6.6 - 655	NA	L	7.30E+01	3.22E+02	3.22E+02

mg/kg - Milligrams per kilogram.
NA - Not applicable; not available.
[a] Data used to determine soil background are based on sampling from IT Corporation, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio.*
[b] 95% UTL - 95 percent upper tolerance limit rounded to three significant figures.
[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95 percent UTL or the maximum detected concentration, whichever is less, is used.
Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Table 5-1

Detected Constituents Above RBSCs and/or BSCs in Surface and Subsurface Soil at Coal Yard No. 1
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY1-SB01						CY1-SB02						CY1-SB03									
				SAMPLE NO	CY0001		CY0002		CY0003		CY0004		CY0005		CY0006		CY0007		CY0008		CY0009		CY0010		CY0011	
				DATE	12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011	
				DEPTH	0.5 - 1.5 Ft		3 - 5 Ft		8 - 10 Ft		0.3 - 1.3 Ft		3 - 5 Ft		8 - 10 Ft		0.5 - 1.5 Ft		3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG		REG		REG		REG		REG		REG		FD		FS		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES																										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-	-	-	0.103	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	-	-	-	-	-	-	-	-	0.138	J	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-	-	-	0.105	J	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	-	-	-	-	-	-	-	-	-	-	-	-	0.0264	J	-	-	-	-	0.025		-	-
Naphthalene	mg/kg	3.6	NE	0.183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02		-	-
Phenanthrene	mg/kg	NE	NE	0.0255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009		-	-
Pyrene	mg/kg	170	NE	0.124	-	-	-	-	-	-	-	-	0.124	J	-	-	-	-	-	-	-	-	-	-	-	-
METALS																										
Aluminum	mg/kg	7,700	15,500	13,100	4,660		10,100		11,000		2,030		6,020		9,910		5,020		11,400		13,100		10000		6,900	
Antimony	mg/kg	3.1	9.3	1.4	0.12	J	-	-	-	-	0.14	J	0.23	J	-	-	-	-	-	-	-	-	1.4	J	-	-
Arsenic	mg/kg	0.39	36.5	34.6	3.1		7.9		8.4		34.6		3.8		7		9		12.5		10.1		19		5.9	
Barium	mg/kg	1,500	826	100	18.5		73.8		79.7		23.9		44		62.7		31.6		84.6		79.8		100		53.6	
Beryllium	mg/kg	16	1	0.67	0.24	J	0.52		0.58		0.061	J	0.5		0.62	J	0.32		0.63		0.67		0.51		0.36	
Cadmium	mg/kg	7	NE	0.8	-	-	0.15	J	0.33	J	-	-	0.52		0.46	J	0.17	J	0.33	J	0.38	J	-	-	-	-
Calcium	mg/kg	NE	52,300	50,000	727		5,470		13,800		447		4,140		3,230		2,340		3,110		2,910		2,600		50,000	
Chromium	mg/kg	NE	29	20.1	7.8		15.4		17.1		3.9		10.7		15.3		8.7		17.8		20.1		18		14.5	
Cobalt	mg/kg	2.3	116	18	3.1		8.3		18		0.79	J	9.5		14.1		3.3		14.1		15.7		11		6.4	
Copper	mg/kg	310	56.2	30	6		19.4		24.9		3.3		18.3		18.1		7.5		24.8		26.7		30		17.6	
Iron	mg/kg	5,500	234,000	43,000	8,320		18,800		22,300		7,840		17,300		17,100		12,700		26,000		20,700		43,000		13,200	
Lead	mg/kg	40	48.6	29.8	4.8		10.7		11.8		5.5		29.8		10.3		7.2		12.8		10.6		14		12.5	
Magnesium	mg/kg	NE	10,400	12,500	614		3,710		6,100		274		1,180		2,260		1,090		3,950		3,710		3,100	B	**12,500**	
Manganese	mg/kg	180	3,506	721	30.6		316		721		23.7		188		401		148		230	J	461	J	290		249	
Mercury	mg/kg	1	0.09	0.076	0.013	J	0.021	J	0.019	J	0.022	J	0.037	J	0.076	J	0.034	J	0.02	J	0.031	J	0.022	J	0.015	J
Nickel	mg/kg	150	55.1	39	7.8		23.1		36		2.3		13.6		34.1		9.4		37.2		39		36		17.5	
Potassium	mg/kg	NE	3,390	1,550	212	J	744	J	1,550		202	J	435	J	770	J	400	J	1,390		1,210		1,000		1,220	
Selenium	mg/kg	39	2	0.53	-	-	-	-	0.53	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/kg	NE	NE	115	-	-	-	-	-	-	111	J	-	-	-	-	111	J	-	-	-	-	-	-	115	J
Thallium	mg/kg	0.078	1.3	1.5	-	-	-	-	0.29	J	-	-	-	-	-	-	-	-	0.41	J	-	-	**1.5**	J	-	-
Vanadium	mg/kg	39	40.9	30	15.4		25.2		21.8		8		18.1		18.7		16.6		23.2		28.9		30		14.7	
Zinc	mg/kg	2,300	321.75	163	21.3		43.9		57.6		9.4		157		163		21.1		57		62.9		74		50.5	
GENERAL CHEMISTRY																										
Total organic carbon	Percent	NE	NE	0.27	0.27		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-1

Detected Constituents Above RBSCs and/or BSCs in Surface and Subsurface Soil at Coal Yard No. 1
Ash Pit 1 and Ash Pit 3 SCR Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio

				LOCATION	CY1-SB04					
				SAMPLE NO	CY0012		CY0013		CY0014	
				DATE	12/20/2011		12/20/2011		12/20/2011	
				DEPTH	1 - 2 Ft		3 - 5 Ft		8 - 10 Ft	
				PURPOSE	REG		REG		REG	
Parameter	Units	RBSC	BSC	MDC	Result	VQ	Result	VQ	Result	VQ
SEMIVOLATILES										
Dibenzofuran	mg/kg	7.8	NE	0.103	-	-	-	-	-	-
Fluoranthene	mg/kg	230	NE	0.138	0.0313	J	-	-	-	-
Fluorene	mg/kg	230	NE	0.105	-	-	-	-	-	-
Methylnaphthalene, 2-	mg/kg	31	NE	0.0334	0.0334	J	-	-	-	-
Naphthalene	mg/kg	3.6	NE	0.183	0.183	J	-	-	-	-
Phenanthrene	mg/kg	NE	NE	0.0255	0.0255	J	-	-	-	-
Pyrene	mg/kg	170	NE	0.124	0.0309	J	-	-	-	-
METALS										
Aluminum	mg/kg	7,700	15,500	13,100	5,480		8,830	J	8,400	
Antimony	mg/kg	3.1	9.3	1.4	0.17	J	0.13	J	0.16	J
Arsenic	mg/kg	0.39	36.5	34.6	24.6		8.4	J	8.3	
Barium	mg/kg	1,500	826	100	46.5		55.1	J	42.5	
Beryllium	mg/kg	16	1	0.67	0.26	J	0.44	J	0.41	
Cadmium	mg/kg	7	NE	0.8	0.8		0.57	J	0.65	
Calcium	mg/kg	NE	52,300	50,000	1,080		19,800	J	26,500	
Chromium	mg/kg	NE	29	20.1	13		13	J	12.1	
Cobalt	mg/kg	2.3	116	18	3.3	J	9.7	J	6.5	
Copper	mg/kg	310	56.2	30	12		19.9	J	19	
Iron	mg/kg	5,500	234,000	43,000	31,700		19,100	J	15,200	
Lead	mg/kg	40	48.6	29.8	7.6		11.4		12.1	
Magnesium	mg/kg	NE	10,400	12,500	748		8,220	J	6,880	
Manganese	mg/kg	180	3,506	721	93.6		279	J	217	
Mercury	mg/kg	1	0.09	0.076	0.049	J	0.018	J	0.015	J
Nickel	mg/kg	150	55.1	39	9.8		24.7	J	19.9	
Potassium	mg/kg	NE	3,390	1,550	716		1,280	J	1,470	
Selenium	mg/kg	39	2	0.53	-	-	-	-	-	-
Silver	mg/kg	39	11.1	0.074	0.074	J	-	-	-	-
Sodium	mg/kg	NE	NE	115	89.5	J	92.3	J	96.7	J
Thallium	mg/kg	0.078	1.3	1.5	0.64	J	0.38	J	-	-
Vanadium	mg/kg	39	40.9	30	22.8		17.1	J	14.3	
Zinc	mg/kg	2,300	321.75	163	27.9		44.7	J	37.5	
GENERAL CHEMISTRY										
Total organic carbon	Percent	NE	NE	0.27	-	-	-	-	-	-

mg/kg - Milligrams per kilogram.
RBSC - Values reflect an incremental lifetime cancer risk (ICLR) of 1E-6 or a noncancer hazard quotient (HQ) of 0.1. For chemicals that exhibit both cancer and noncancer effects, whichever type of effect results in a lower concentration (using an ICLR of 1E-6 and an HQ of 0.1), that concentration is selected as the RBSC.
BSC - Background screening concentration.
MDC - Maximum detected concentration for the area of concern.
Shaded cell indicates value is greater than RBSC.
Bolded text indicates values are greater than BSC.
NE - Not established (RBSCs), not evaluated (BSCs).
"-" - Not detected.

Validation Qualifiers (VQ)
J - The analyte was positively identified; the reported value is estimated.
B - The analyte was not detected significantly above the levels found in the associated method blank or field blanks.

FIGURES

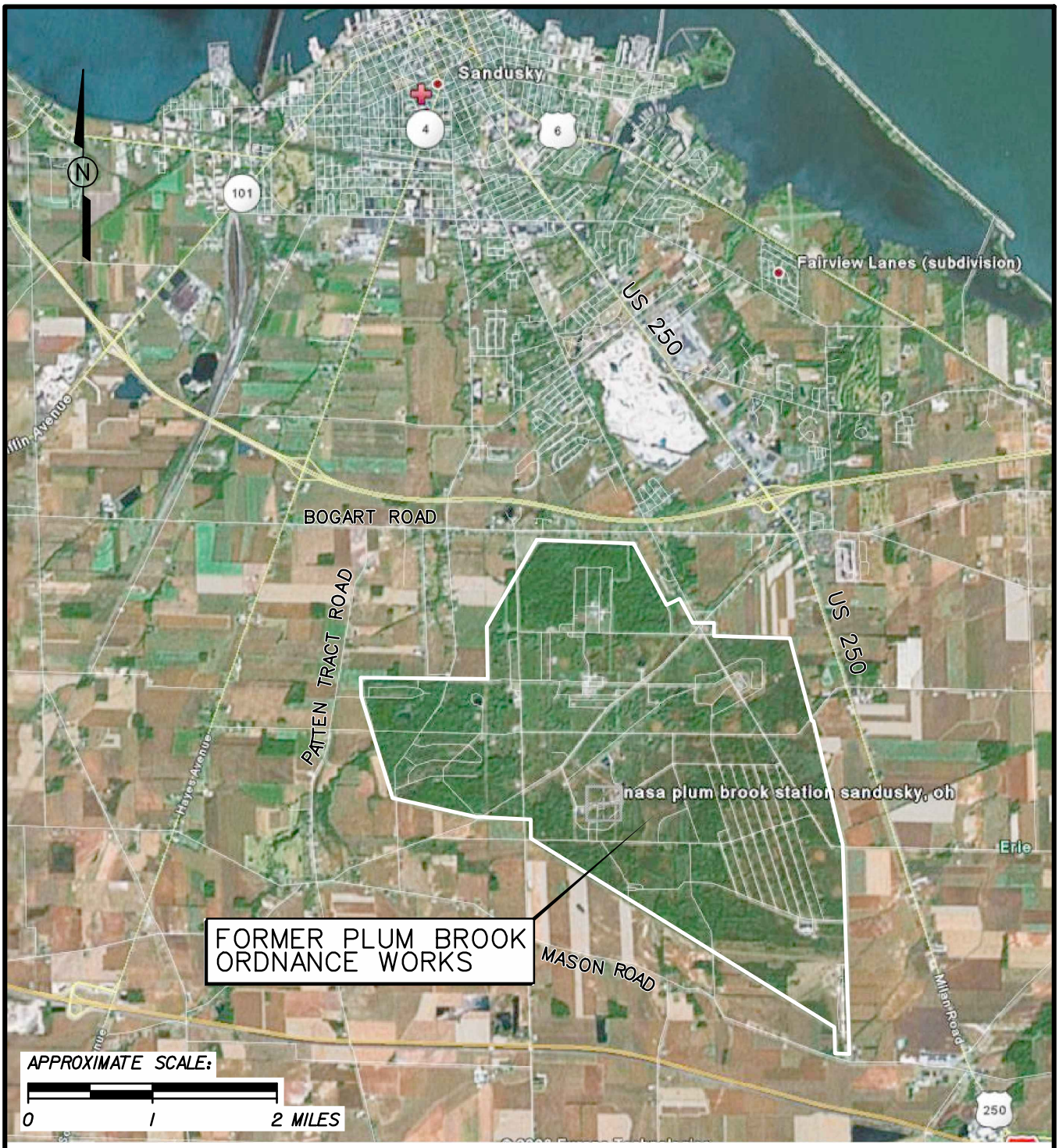

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 1 AND ASH PIT 3 SCR
ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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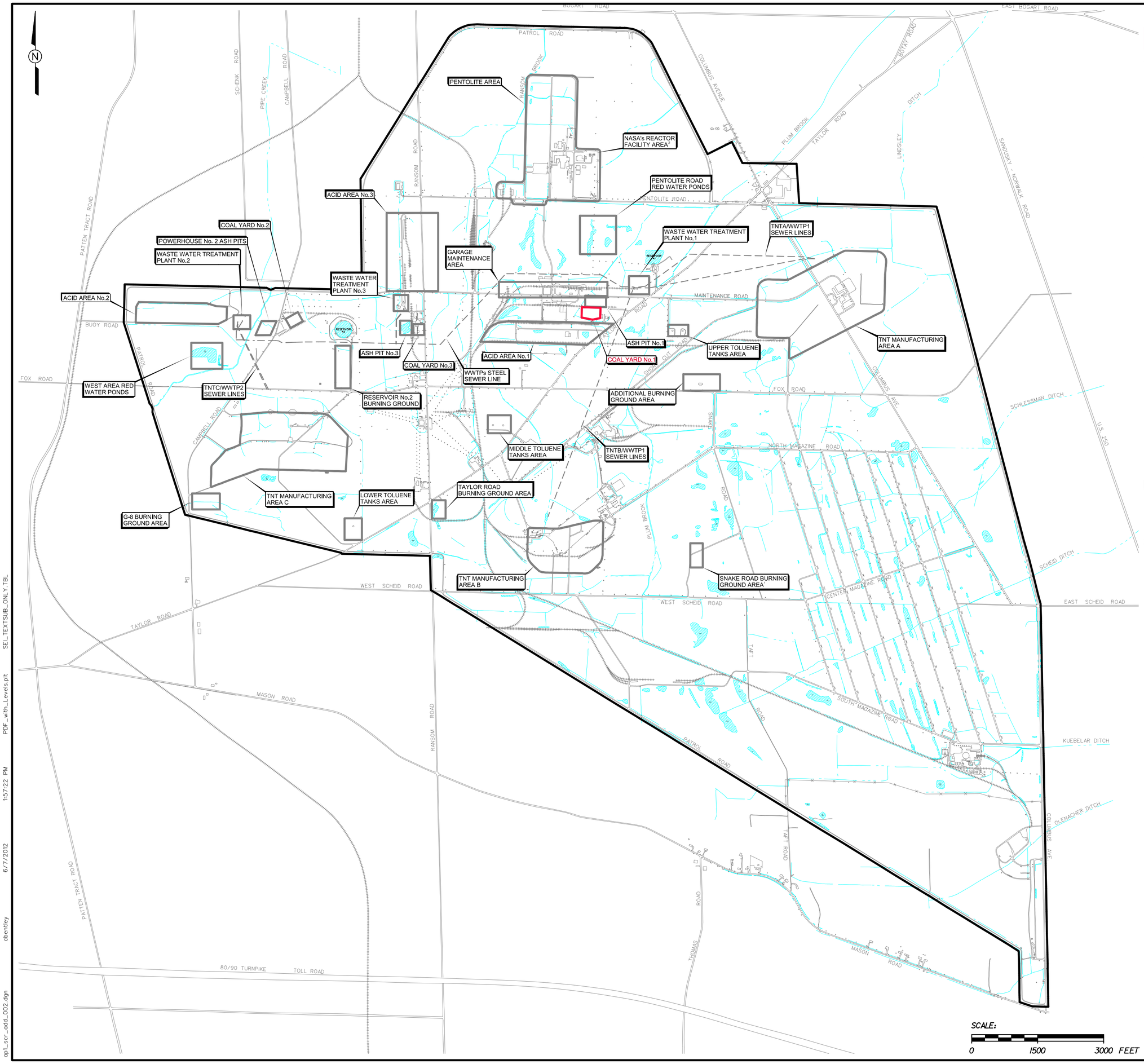

LEGEND:

- AREA OF CONCERN
- APPROXIMATE LOCATION OF SEWER LINES
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

SCALE:

0 1500 3000 FEET

FIGURE 1-2
LOCATION OF COAL YARD No.1 AT PBOW

ASH PIT 1 AND ASH PIT 3 SCR ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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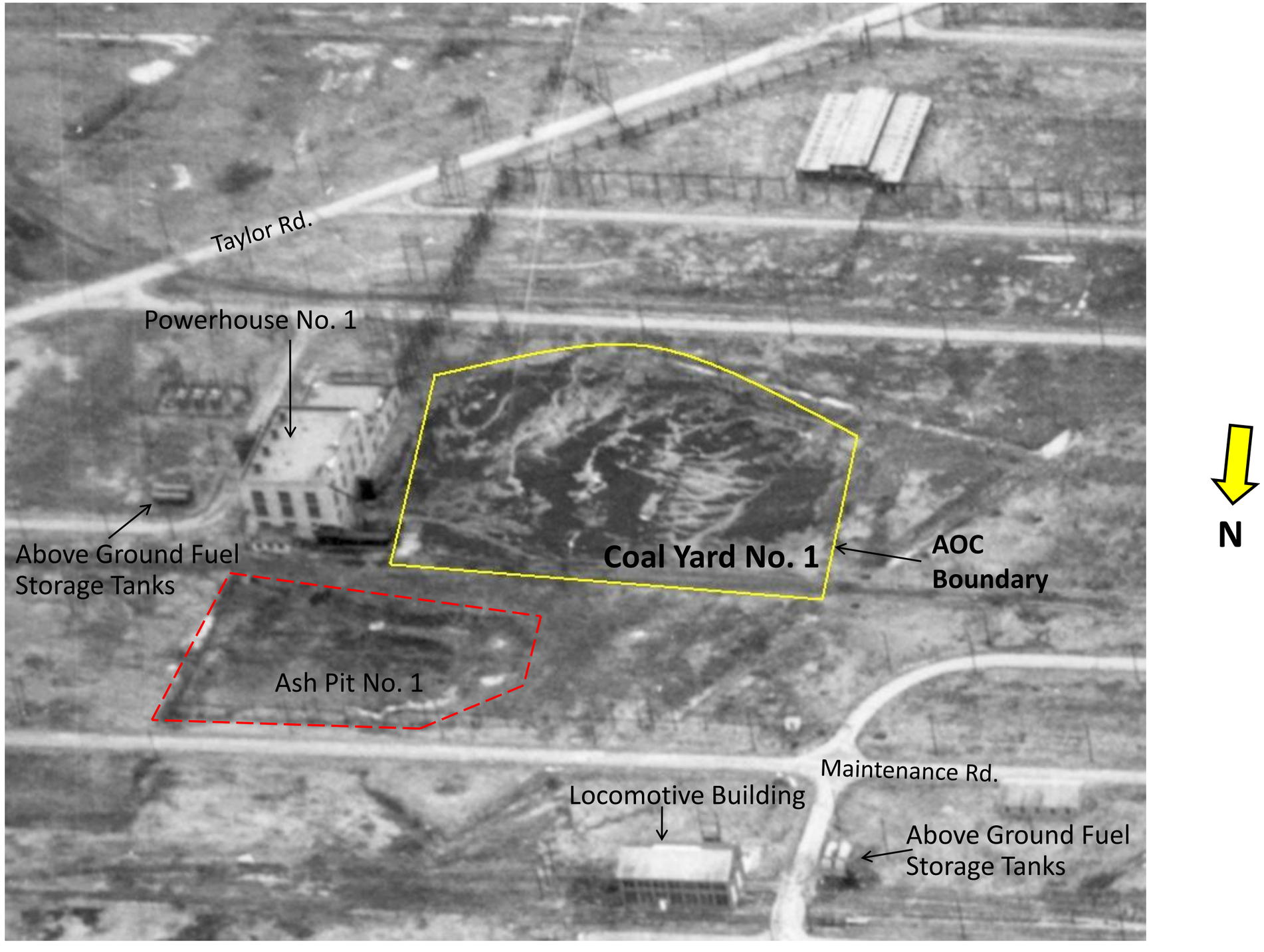
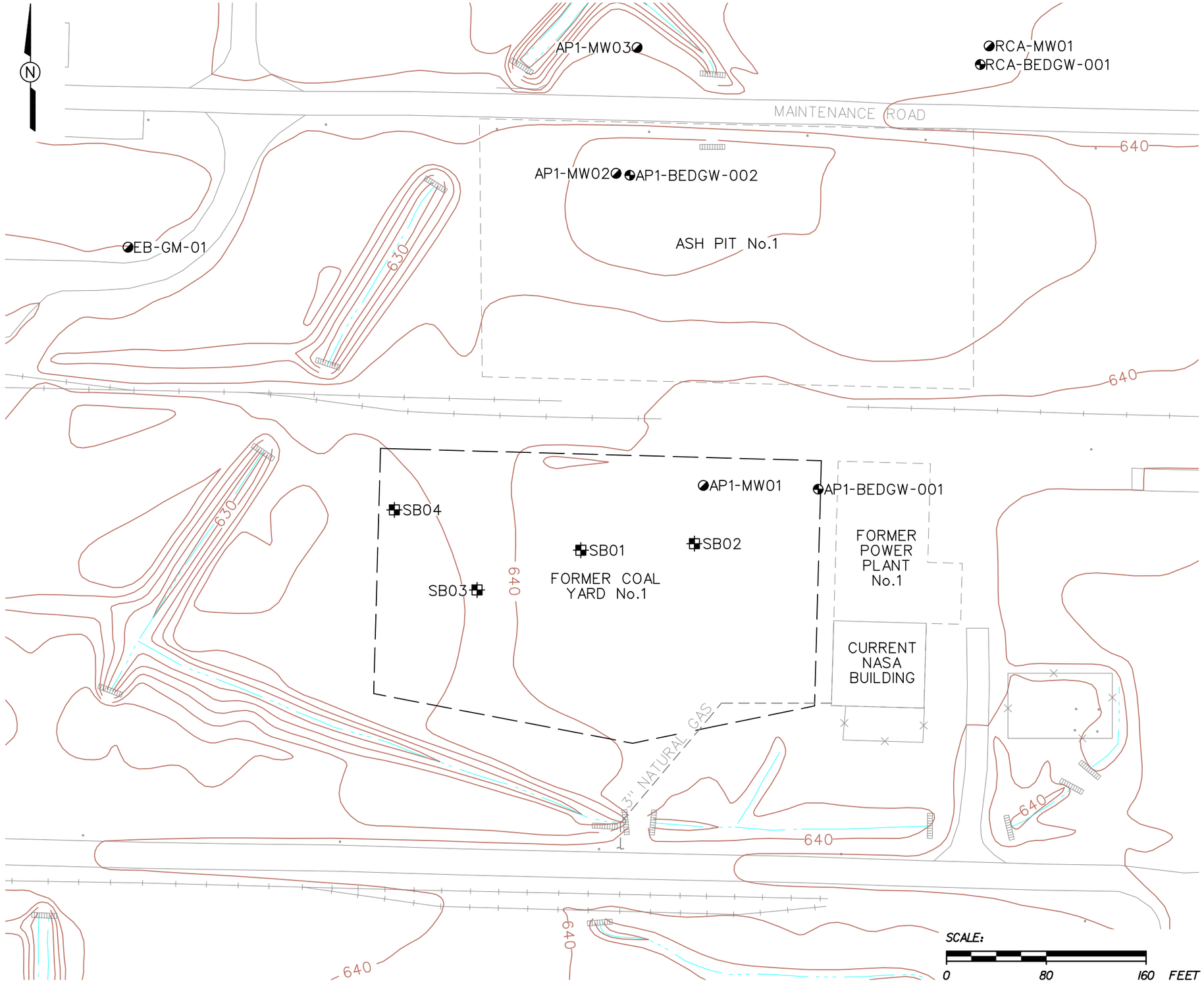


Figure 1-3
Coal Yard No. 1, Circa 1958 Photo (view is to the South)



LEGEND:

- OVERBURDEN MONITORING WELL (SCREENED IN SHALE)
- BEDROCK MONITORING WELL (SCREENED IN LIMESTONE)
- SOIL BORING
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES
- APPROXIMATE HISTORICAL COAL STORAGE PERIMETER BASED ON AERIAL PHOTO
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTEVAL)

FIGURE 2-1
GENERAL SITE FEATURES OF COAL YARD No.1 WITH SITE TOPOGRAPHY AND SAMPLE LOCATIONS

ASH PIT 1 AND ASH PIT 3 SCR ADDENDUM FOR COAL YARD No.1
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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APPENDIX A

SOIL BORING SAMPLE COLLECTION LOGS

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB01
Sample Number: CY0001
Sample Name: PB11-SS-CY1-SB01-CY0001-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel bucket auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: ~~EW 1105~~ 1100
Start Depth: ~~EW 0.2'~~ 0.5'
End Depth: ~~EW 1.2'~~ 1.5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/EW/KB

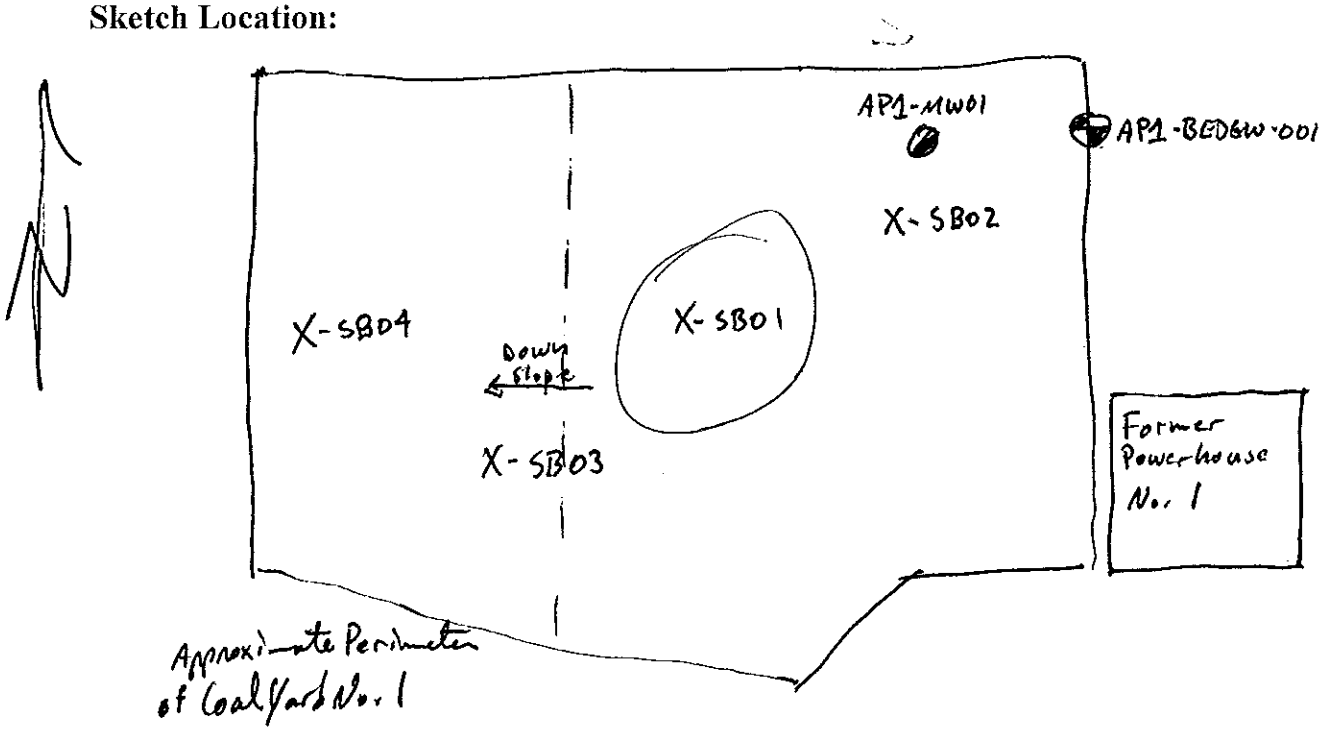
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM
TOC	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1/23/2012

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB01
Sample Number: CY0002
Sample Name: PB11-DS-CYA-SB01-CY0002-~~(0-1)~~ 3-5'-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel bucket auger,

Task: GMA_OCT2011
Collection Date: ~~12-20-11~~ 12-20-11
Collection Time: ~~1119~~ 1115
Start Depth: ~~3'~~ 3'
End Depth: ~~8'~~ 5'
Sample Matrix: SOIL
Sample Team: GW/~~SB~~ GW/KB

QC Partners:
(TB) (ER) (FB)

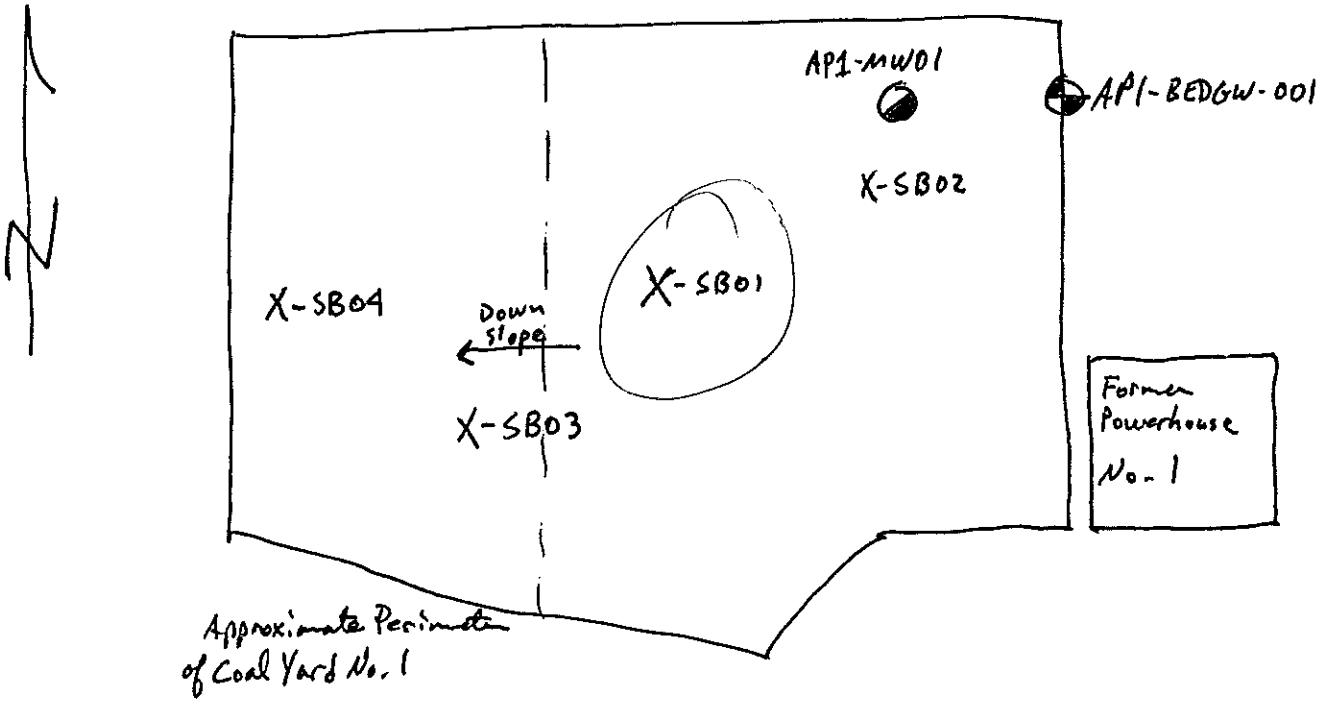
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: L. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: CY1-SB01
Sample Number: CY0003
Sample Name: PB11-DS-CY1-SB01-CY0003-(8-10)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: ~~12-19-11~~ 12-20-11
Collection Time: ~~1140~~ 1145
Start Depth: 8'
End Depth: 10'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

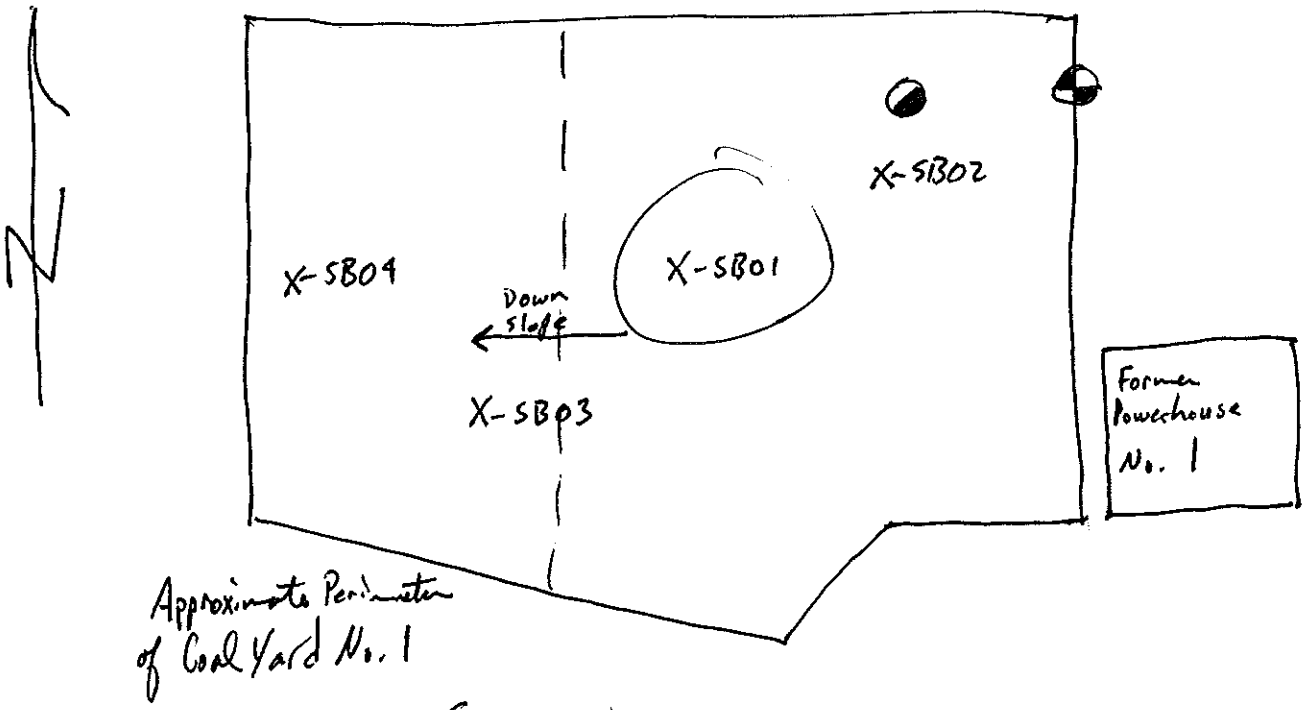
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E. W. Weaver 12-2011

Reviewed BY / Date: Edward S. Nixon 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02
Sample Number: CY0004
Sample Name: PB11-SS-CY1-SB02-CY0004-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1000
Start Depth: 0.3
End Depth: 1.3
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

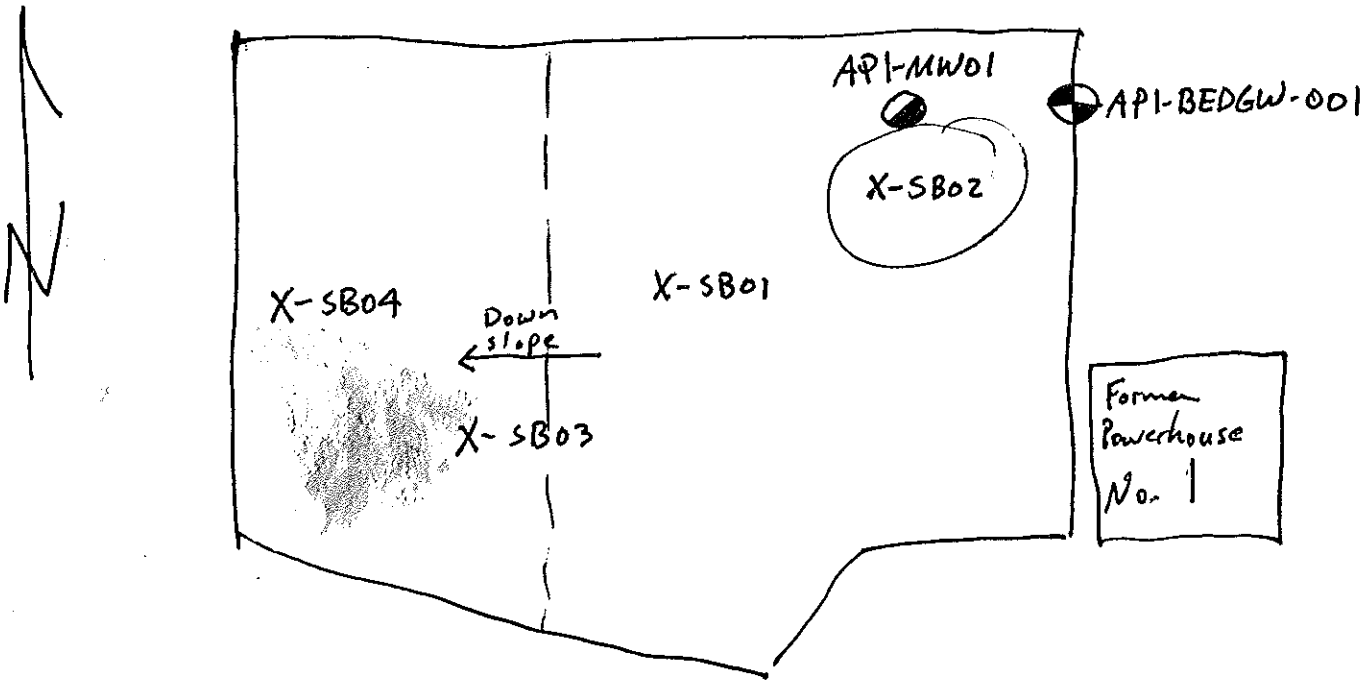
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02
Sample Number: CY0005
Sample Name: PB11-DS-CY1-SB02-CY0005-(3-5)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1015
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

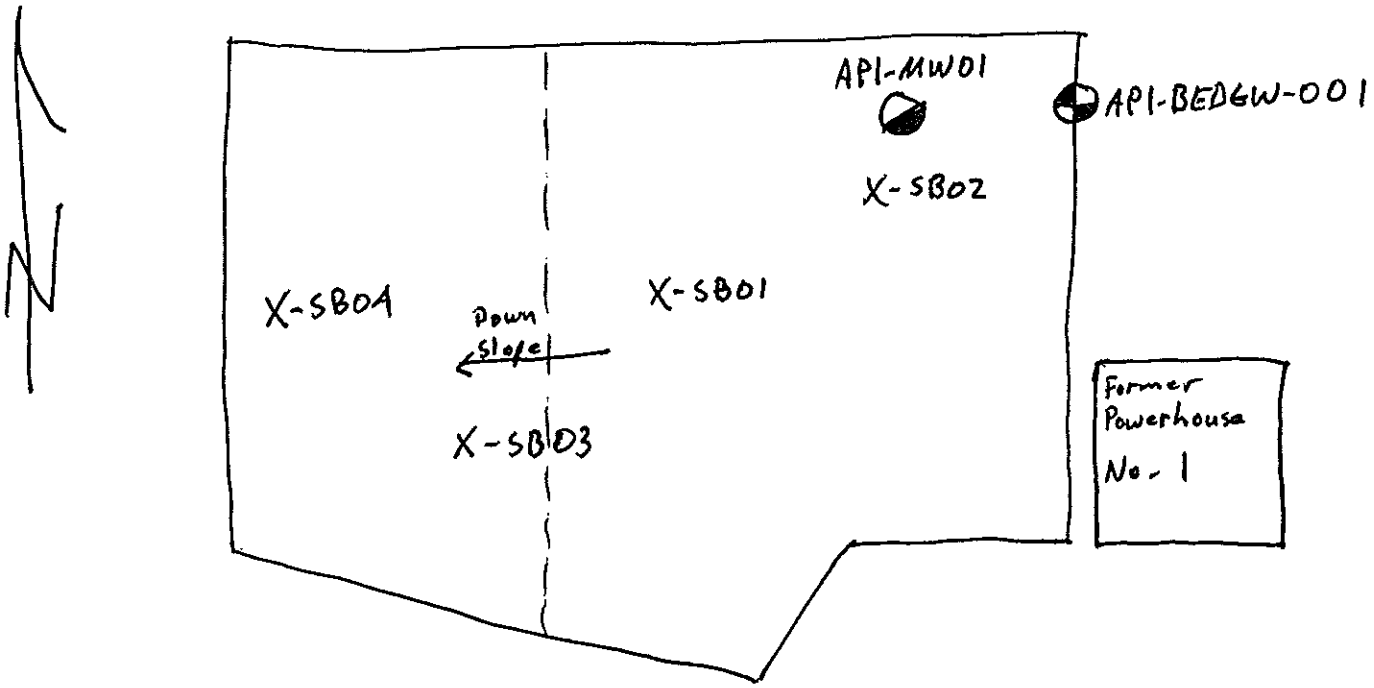
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB02

Sample Number: CY0006

Sample Name: PB11-DS-CY1-SB02-CY0006-(8-10)-REG

Sampling Method: SS

Sample Type: DS *Sample Purpose:* REG

Sampling Equip: Stainless Steel Bucket Auger

QC Partners:

(TB) (ER) (FB)

Task: GMA_OCT2011

Collection Date: 12-20-11

Collection Time: 1042

Start Depth: 8'

End Depth: 10'

Sample Matrix: SOIL

Sample Team: EW/KB

ERPIMS Values:

Sacode:

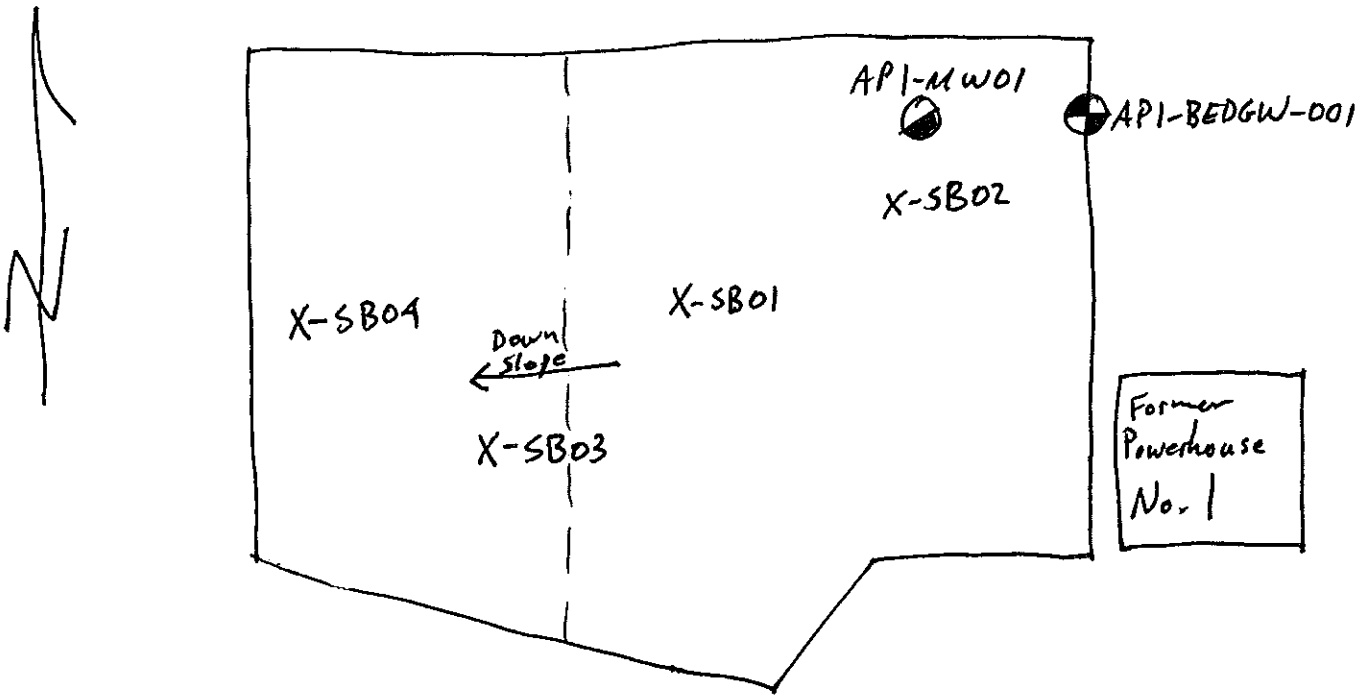
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

Comments:

Sketch Location:



Logged BY / Date: 12-20-11 *Reviewed BY / Date:* 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB03
Sample Number: CY0007
Sample Name: PB11-SS-CY1-SB03-CY0007-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1155
Start Depth: 0.5'
End Depth: 1.5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

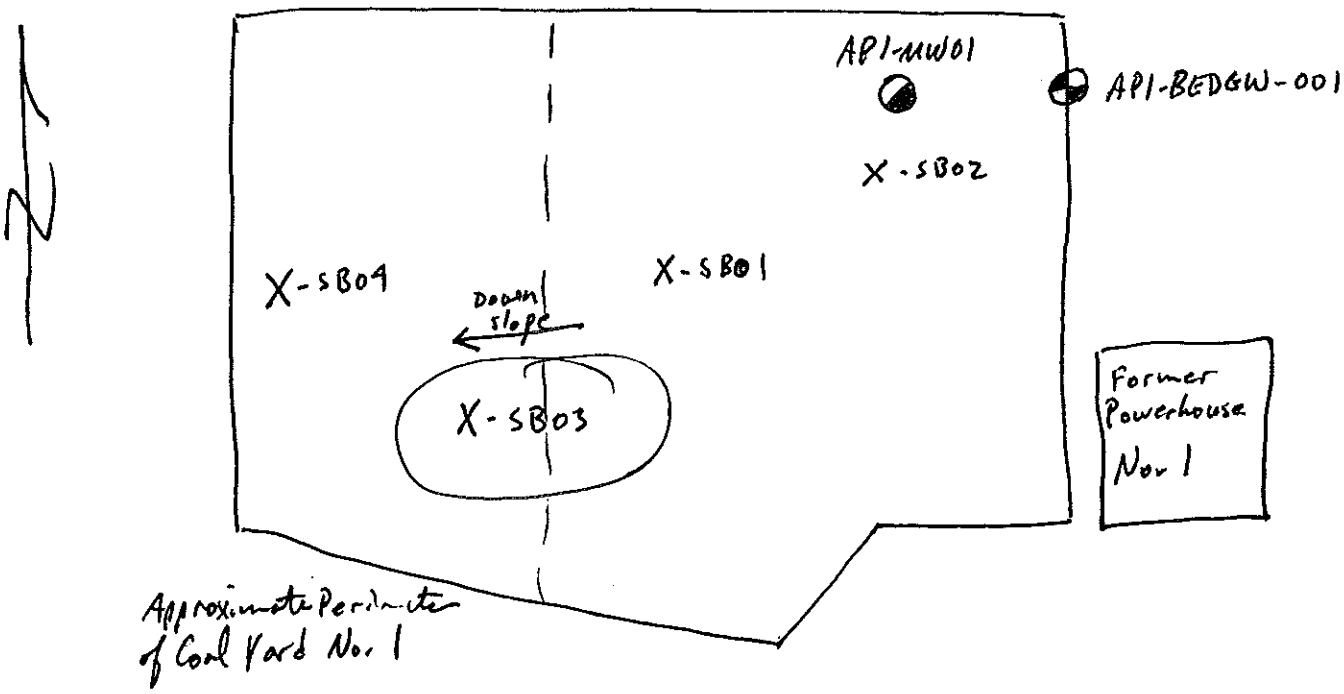
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: Eric W. Weaver 12-20-11 *Reviewed BY / Date:* Edward S. Weaver 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB03
Sample Number: CY0008
Sample Name: PB11-DS-CY1-SB03-CY0008-(3-5)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1205
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

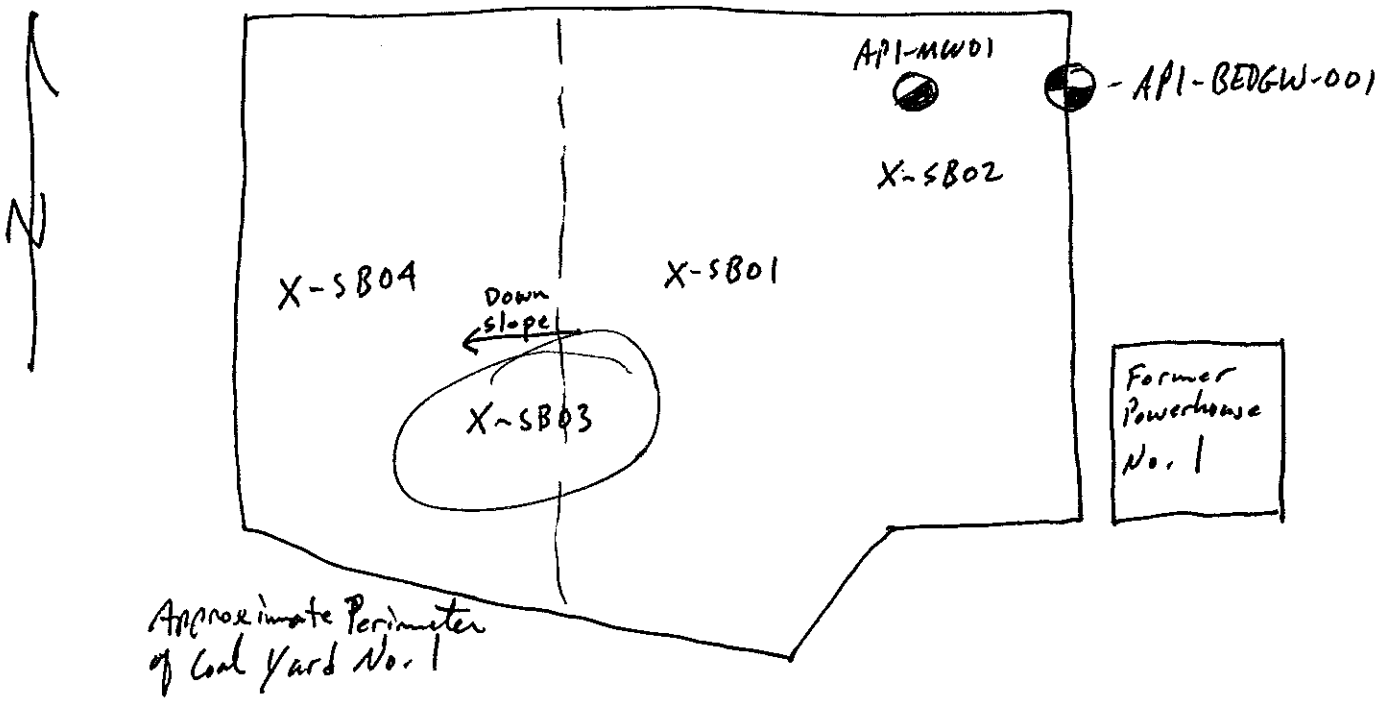
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected FD (CY0009) and FS (CY0010) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11

Reviewed BY / Date: Edward Scribner 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: **CY1-SB03**

Sample Number: **CY0009**

Sample Name: **PB11-DS-CY1-SB03-CY0009-(3-5)-FD**

Sampling Method: **SS**

Sample Type: **DS** *Sample Purpose:* **FD**

Sampling Equip: Stainless Steel Bucket Auger

QC Partners:

(TB) (ER) (FB)

Task: **GMA_OCT2011**

Collection Date: 12-20-11

Collection Time: 1205

Start Depth: 3'

End Depth: 5'

Sample Matrix: **SOIL**

Sample Team: EW/KB

ERPIMS Values:

Sacode:

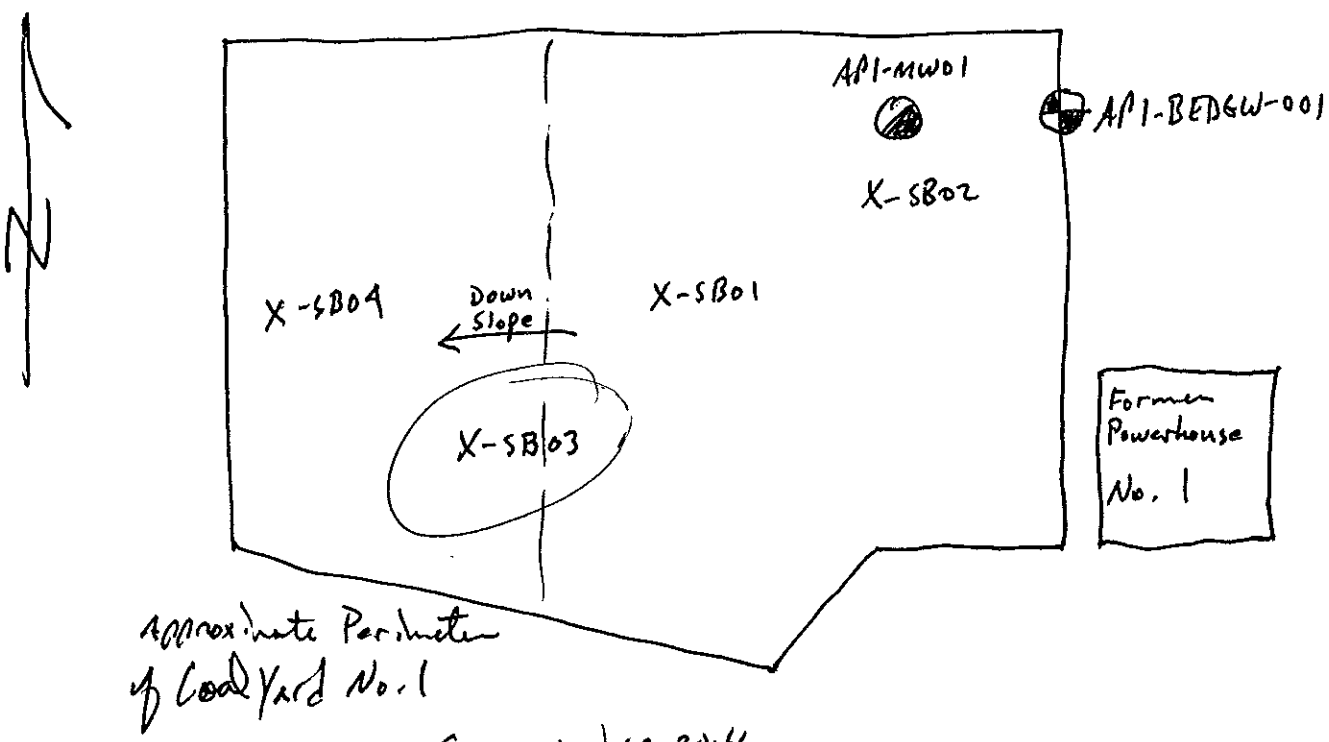
Lot Control#:

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

Comments: Also collected regular sample (CY0008) and FS (CY0010) at this location.

Sketch Location:



Logged BY / Date: Eric W. Power 12-20-11

Reviewed BY / Date: Edward S. Wilson 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111TA

Location Code: CY1-SB03
Sample Number: CY0010
Sample Name: PB11-DS-CY1-SB03-CY0010-(3-5)-FS
Sampling Method: SS
Sample Type: DS *Sample Purpose:* FS
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1205
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

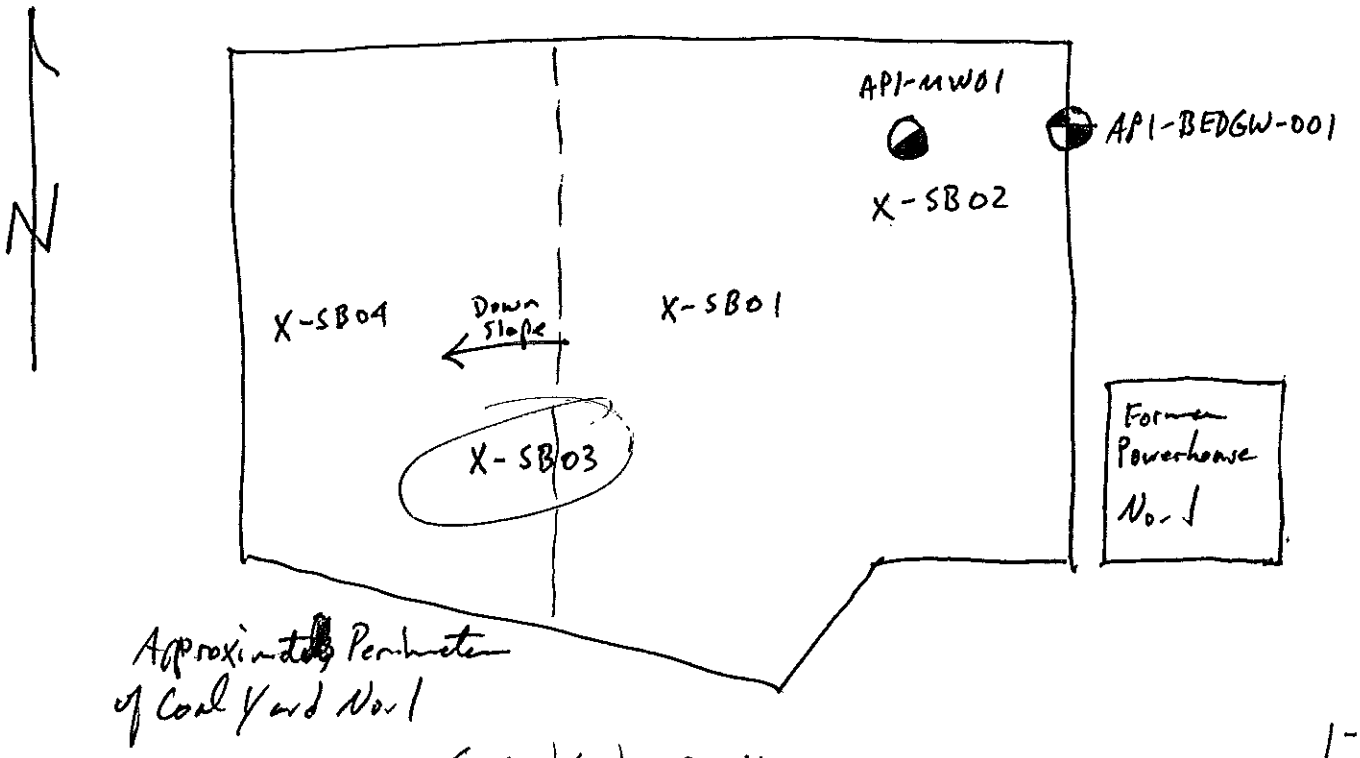
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	1	4	oz	CWM
METALS3	N	B	1	8	oz	CWM
PCB3	N	B	1	8	oz	CWM
SEMIVOLATILES3	N	B	1	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0008) and FD (CY0009) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward S. Meaux 1-23-12

Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111 ACCT

Location Code: CY1-SB03

Sample Number: CY0011

Sample Name: PB11-DS-CY1-SB03-CY0011-(8-10)-REG

Sampling Method: SS

Sample Type: DS *Sample Purpose:* REG

Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011

Collection Date: 12-20-11

Collection Time: ~~EW 1242~~ 1225

Start Depth: ~~EW 6.0'~~ 8'

End Depth: ~~EW 8.0'~~ 10'

Sample Matrix: SOIL

Sample Team: EW/KB

QC Partners:

(TB) (ER) (FB)

Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

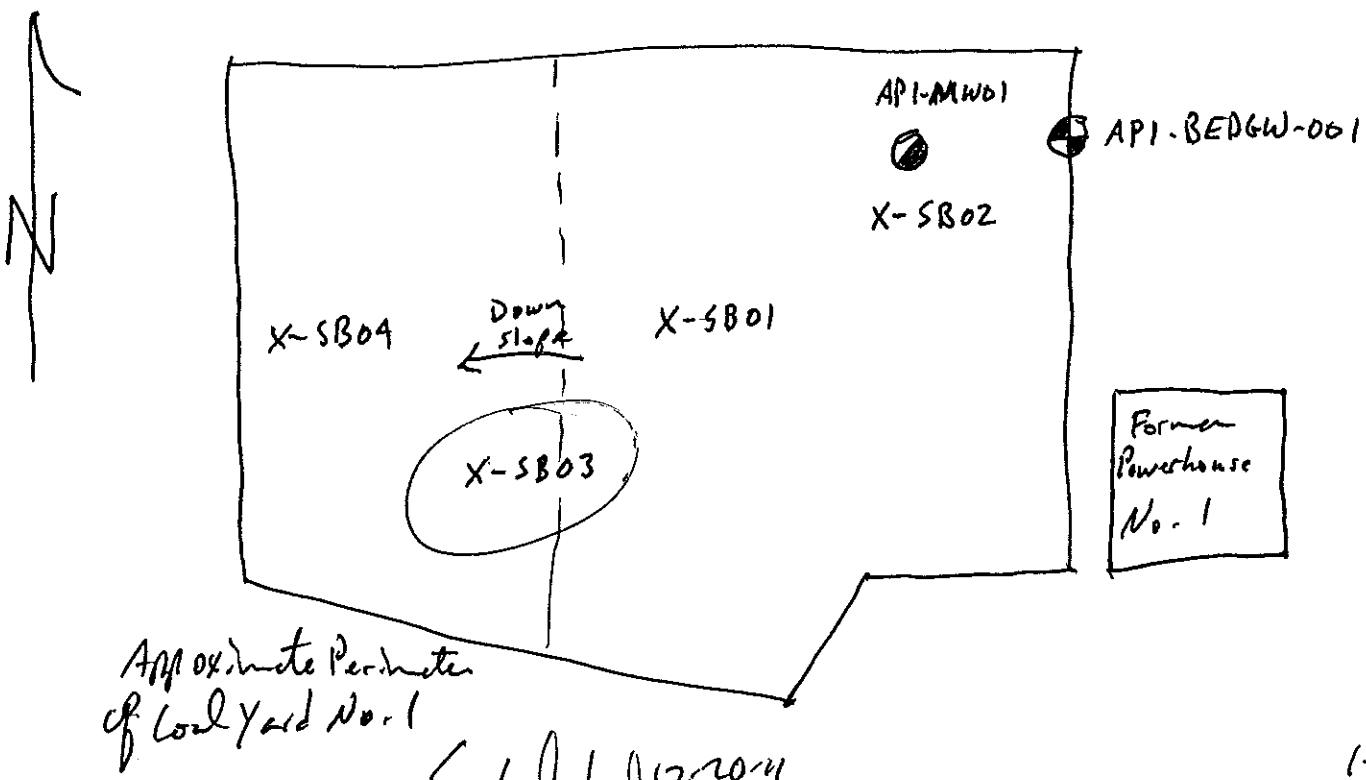
ERPIMS Values:

Sacode:

Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E.W. Weaver 12-20-11 *Reviewed BY / Date:* Edward Sanborn 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0012
Sample Name: PB11-SS-CY1-SB04-CY0012-(0-1)-REG
Sampling Method: HA
Sample Type: SS *Sample Purpose:* REG
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1242
Start Depth: 1.0'
End Depth: 2.0'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

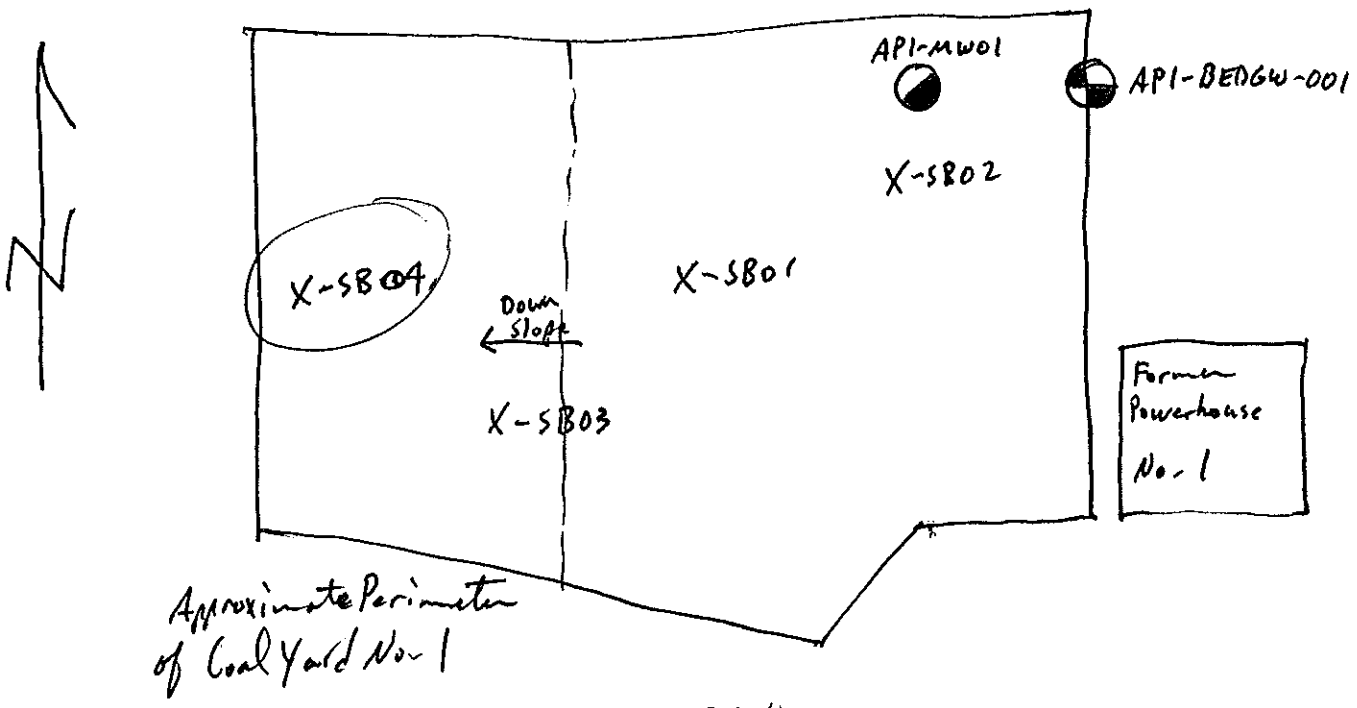
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: ~~Also collected MS (CY0013MS) and MSD (CY0013MSD) at this location.~~ EW

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: **CY1-SB04**
Sample Number: **CY0013**
Sample Name: **PB11-DS-CY1-SB04-CY0013-(3-5)-REG**
Sampling Method: **SS**
Sample Type: **DS** *Sample Purpose:* **REG**
Sampling Equip: Stainless Steel Bucket Auger

Task: **GMA_OCT2011**
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: **SOIL**
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

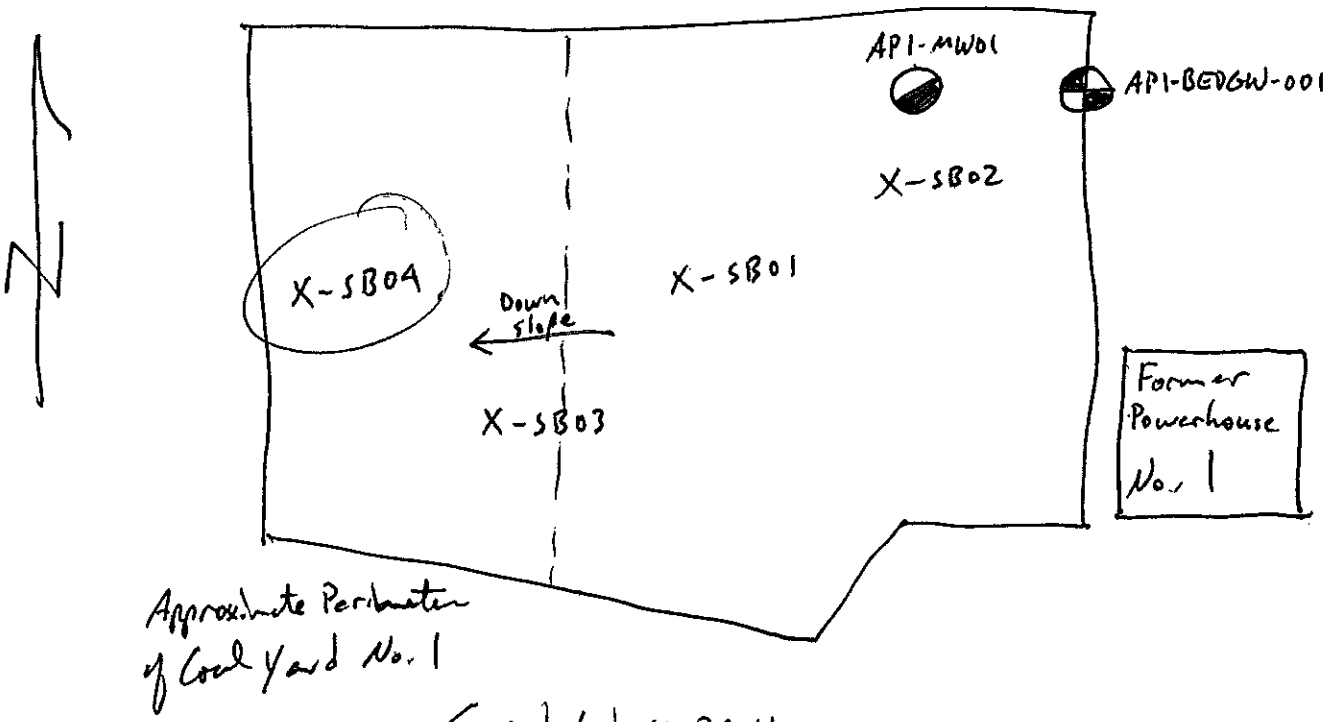
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected MS (CY0013MS) and MSD (CY0013MSD) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver 12-20-11 *Reviewed BY / Date:* Edward [illegible] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS
Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0013MS
Sample Name: PB11-DS-CY1-SB04-CY0013MS-(3-5)-MS
Sampling Method: SS
Sample Type: DS *Sample Purpose:* MS
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

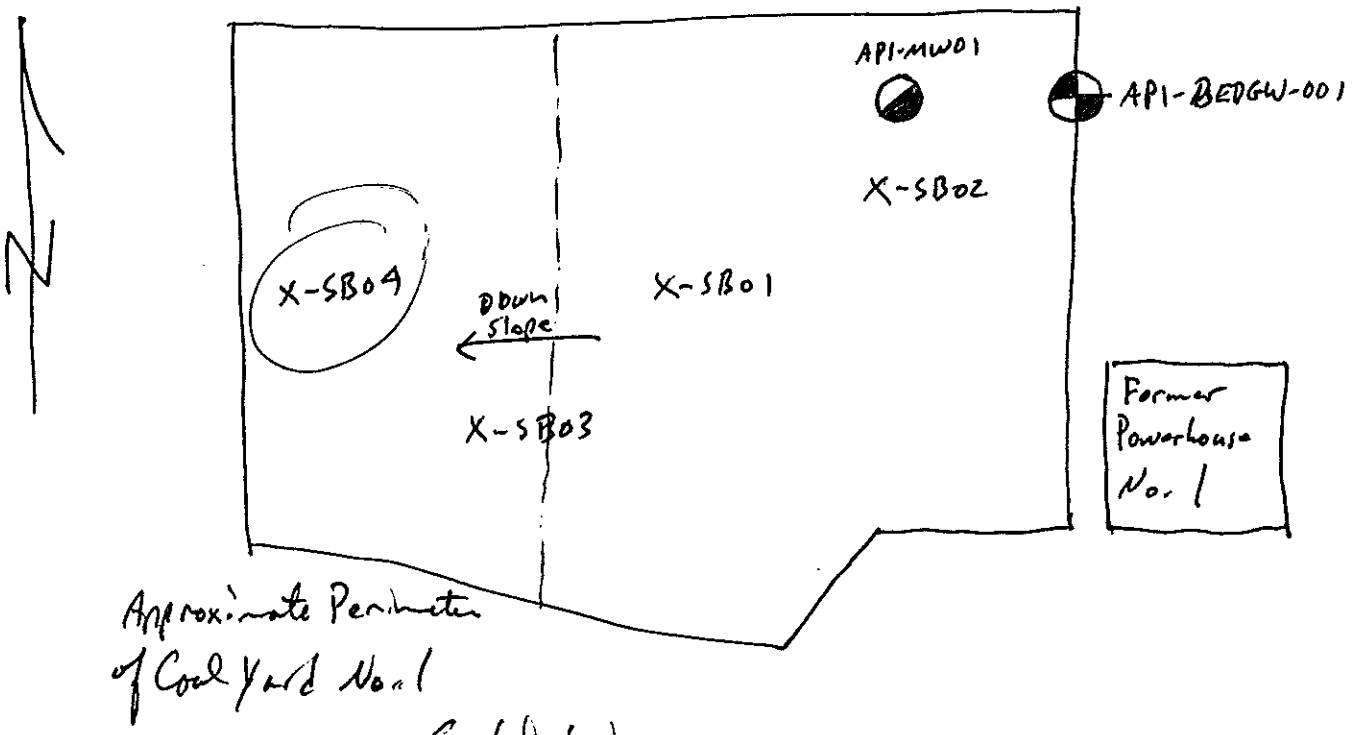
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0013) and MSD (CY0013MSD) at this location.

Sketch Location:



Logged BY / Date: E. W. Weaver *Reviewed BY / Date:* [signature] 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0013MSD
Sample Name: PB11-DS-CY1-SB04-CY0013MSD-(3-5)-MSD
Sampling Method: SS
Sample Type: DS *Sample Purpose:* MSD
Sampling Equip: Stainless Steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1250
Start Depth: 3'
End Depth: 5'
Sample Matrix: SOIL
Sample Team: EW/KB

QC Partners:
(TB) (ER) (FB)

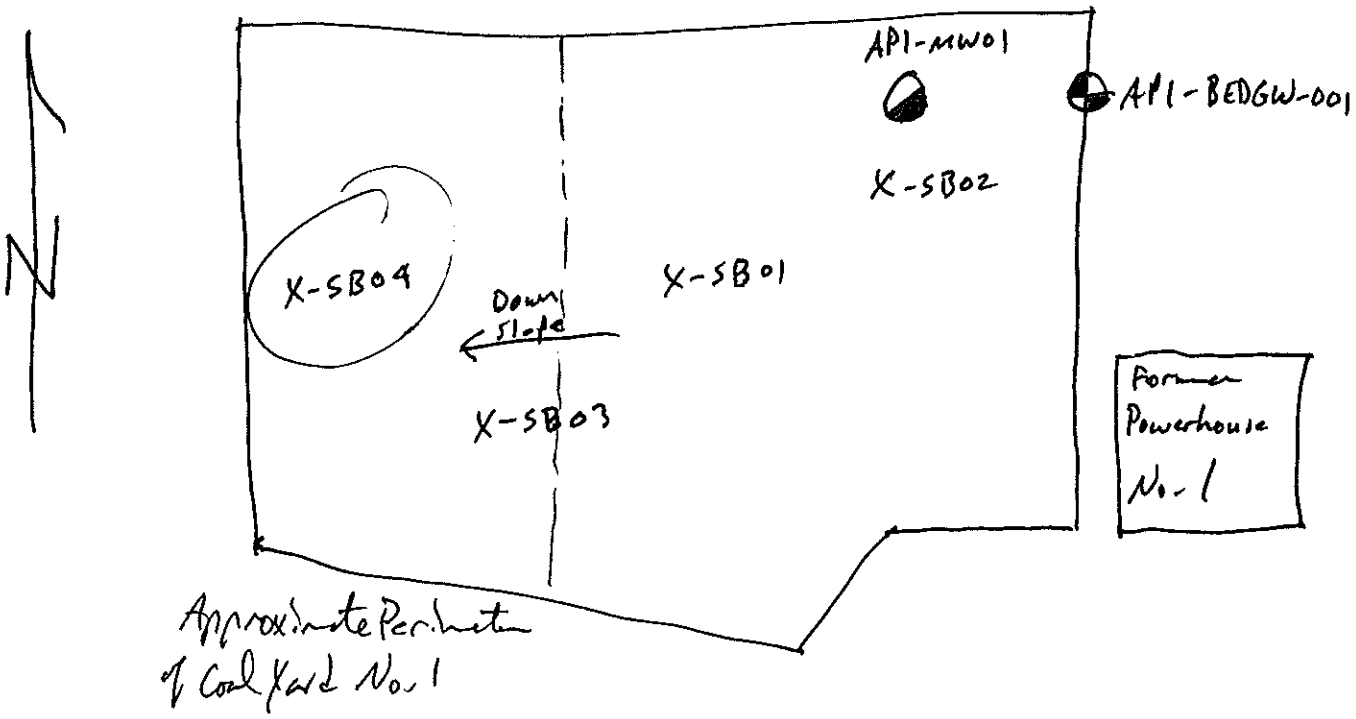
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
PCB3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments: Also collected regular sample (CY0013) and MS (CY0013MS) at this location.

Sketch Location:



Logged BY / Date: E.W. Weaver 12-20-11 *Reviewed BY / Date:* Edward E. Weaver 1-23-12

Shaw™
Shaw E & I, Inc.

Sample Collection Log

132457 - PLUM BROOK ORDNANCE WKS

Manager: Steve Downey

RFA / COC Number: PB122111ACCT

Location Code: CY1-SB04
Sample Number: CY0014
Sample Name: PB11-DS-CY1-SB04-CY0014-(8-10)-REG
Sampling Method: SS
Sample Type: DS *Sample Purpose:* REG
Sampling Equip: Stainless steel Bucket Auger

Task: GMA_OCT2011
Collection Date: 12-20-11
Collection Time: 1340
Start Depth: 8'
End Depth: 10'
Sample Matrix: SOIL

QC Partners:
(TB) (ER) (FB)

Sample Team: EW/KB

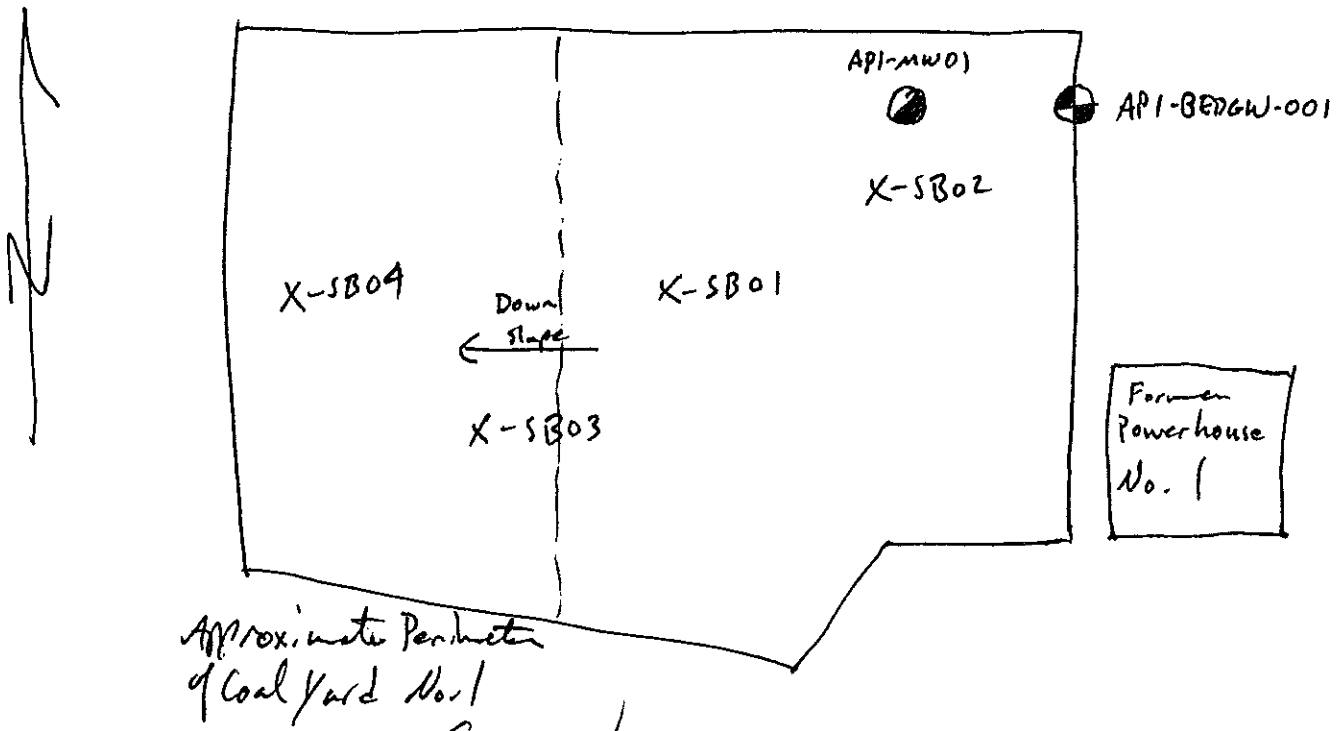
Containers

Analytical Suite	Flt	Frtn	Qty	Size	Units	Type
EXPLOSIVES	N	A	2	8	oz	CWM
METALS3	N	A	2	8	oz	CWM
SEMIVOLATILES3	N	A	2	8	oz	CWM

ERPIMS Values:
Sacode:
Lot Control#:

Comments:

Sketch Location:



Logged BY / Date: E W Weaver

Reviewed BY / Date: Edward E Weaver 1-23-12

APPENDIX B

SOIL BORING HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE DRILL LOGS

HTRW DRILLING LOG

DISTRICT	Nashville
HOLE NUMBER	CY1-SB01
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	640.31 N-623312.31 E-1918693.70
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
15. DEPTH GROUNDWATER ENCOUNTERED	0.5'
13. DEPTH DRILLED INTO ROCK	0
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	10'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

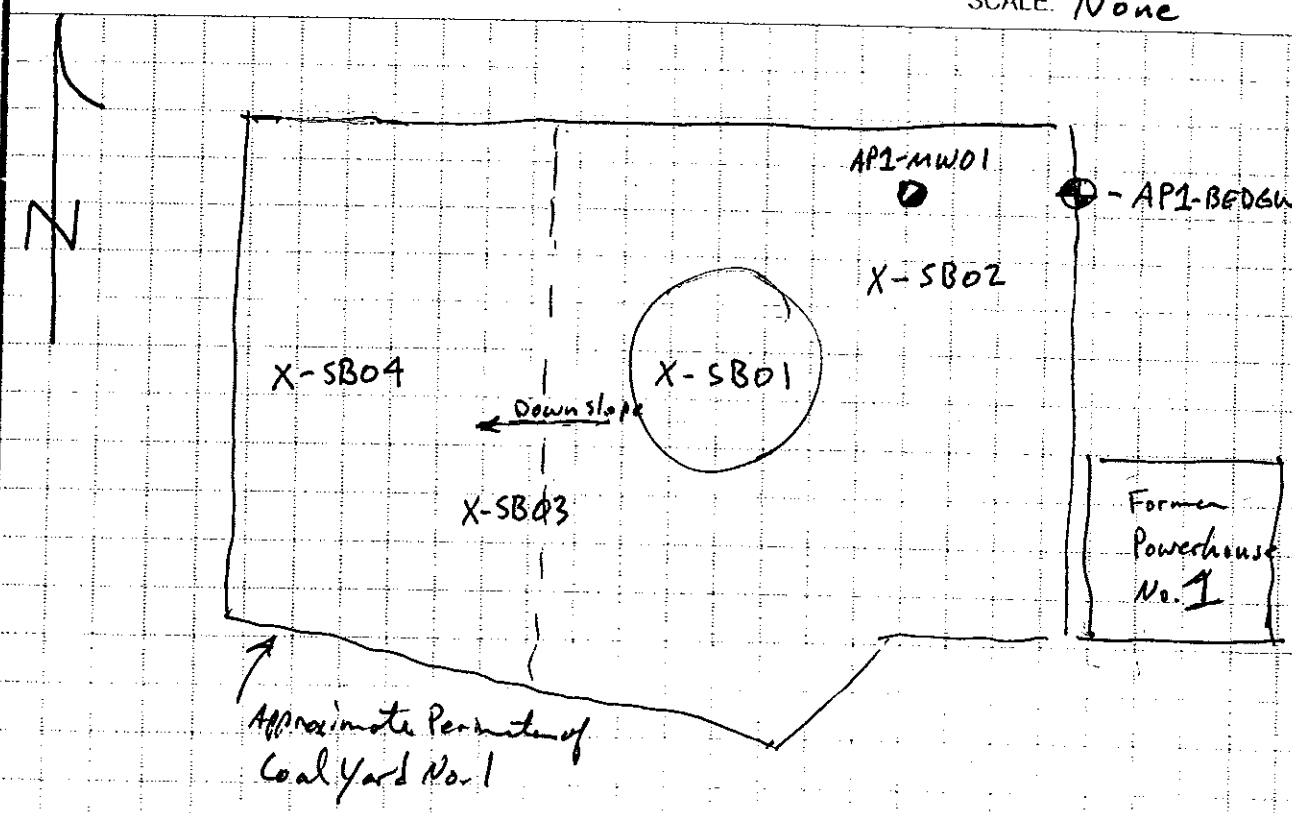
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	PCB's	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	E. W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB01

DAC

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB01

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) silt with sand, coal, moist, soft. 0.5'	ML		Time			
	1	Dark yellowish brown (10YR 4/6) fine grain sand with silt, wet, loose. 3'	SM		1100	0.5'-1.5' CY0001		
	3	Gray (10YR 5/1) silt with clay, wet, soft. 6'	ML		1115	3.0'-5.0' CY0002		
	6	Gray (10YR 5/1) clay with sand, moist, stiff.	CL		1145	8.0'-10.0' CY0003		
	10	Total Depth = 10 Ft						

Project: PBOW

Hole Number: CY1-SB01

HTRW DRILLING LOG

DKR

1. COMPANY NAME	Shaw E+I
DISTRICT	Nashville
HOLE NUMBER	CY1-SB02
2. DRILL SUBCONTRACTOR	NA
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	640.42 N-623317.59 E-1918784.80
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
15. DEPTH GROUNDWATER ENCOUNTERED	1.5'
13. DEPTH DRILLED INTO ROCK	0
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14. TOTAL DEPTH OF HOLE	10'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

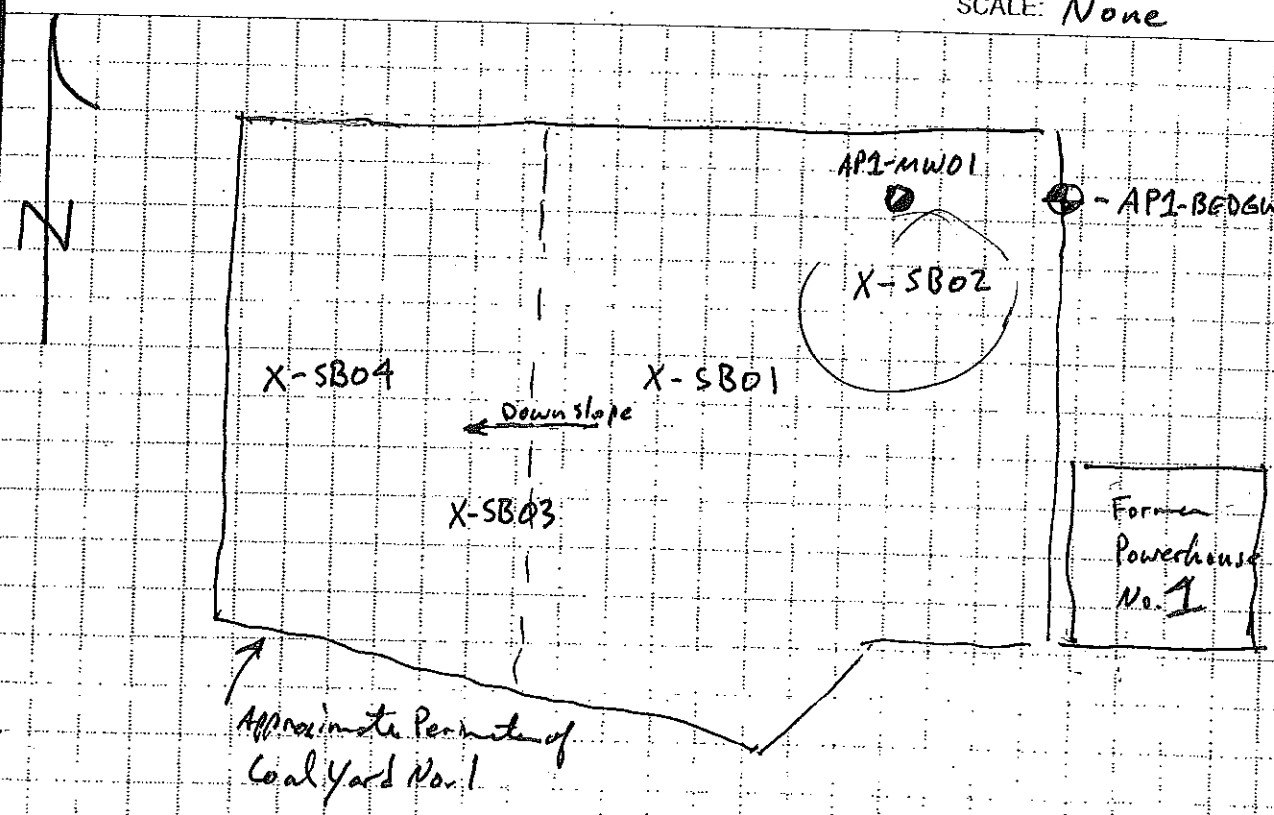
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	PCB's	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB02

DKR

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CYI-SB02

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Very dark gray (10YR 3/1) silt with sand, coal, moist, soft 0.3'	ML		Time			
		Yellowish brown (10YR 5/6) very fine grain sand with silt, moist, loose.	SM		1000	0.3'-1.3' CY0004		
	1	—wet						
	2							
	3					3.0'-5.0' CY0005		
	4	4'			1015			
		Black (10YR 2/1) silt with clay, sand, cinders, wet, soft.	ML					
	5							
	6	6'						
		Olive brown (2.5Y 4/3) silt with sand, clay, moist, stiff.						
	7							
	8	8'						
		Dark yellowish brown (10YR 4/6) clay with silt, moist, stiff.	CL			8.0'-10.0' CY0006		
	9				1042			
	10	Total Depth = 10 ft						

Project: PBOW

Hole Number: CYI-SB02

DAK

HTRW DRILLING LOG

1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
DISTRICT	Nashville
HOLE NUMBER	CYI-SB03
SHEET / SHEETS	1 OF 2
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	636.99 N-623280.45 E-1918640.43
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
13. DEPTH DRILLED INTO ROCK	0
14. TOTAL DEPTH OF HOLE	10'
15. DEPTH GROUNDWATER ENCOUNTERED	None
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

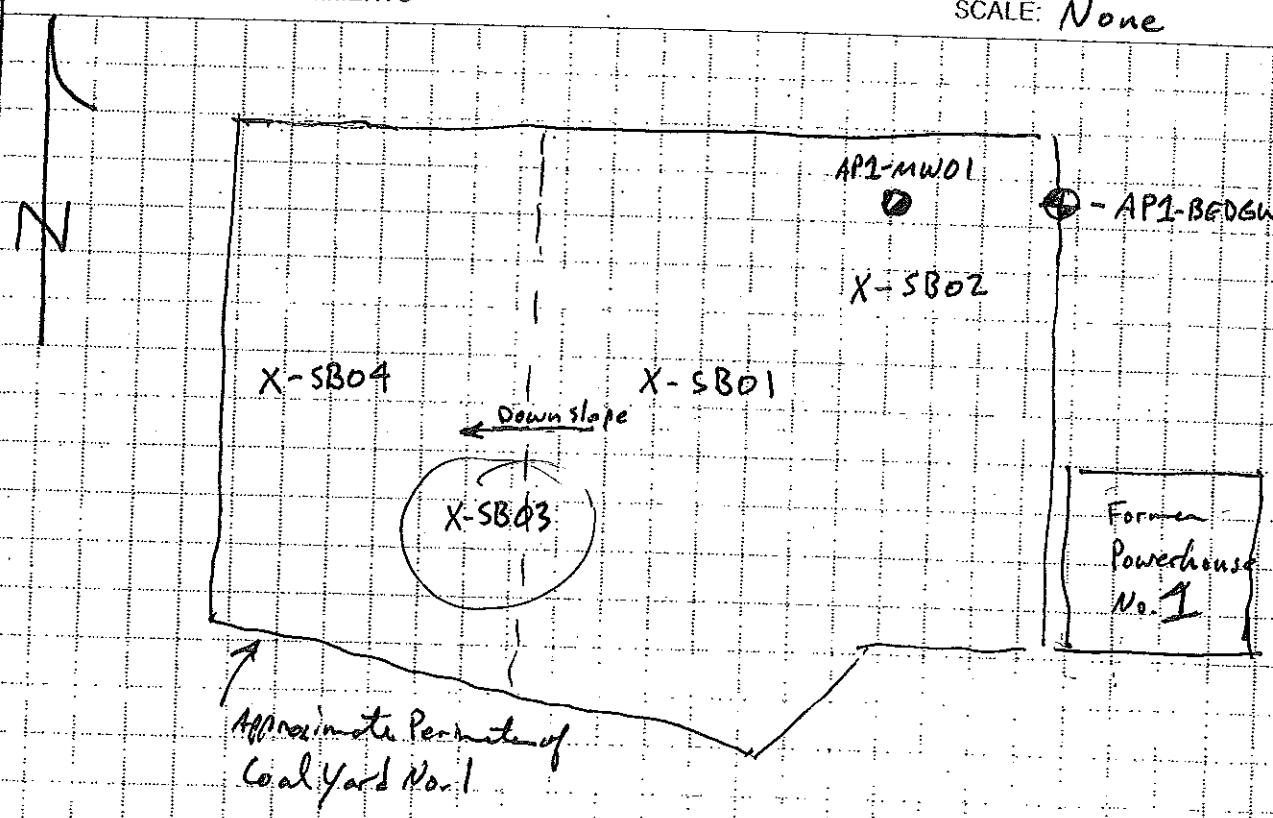
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
—	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
✓	—	✓	Explosives	SVOC's	~~PCB's~~	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓	—	—	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CYI-SB03

DKK

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB03

Project: PBOW

Geologist: E. Weaver

Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) silt with clay, coal moist, soft. 0.5'	ML		Time			
		Very dark gray (10YR 3/1) silt with clay, sand, moist, medium stiff. 3'			1155	0.5'-1.5'		
		Gray (10YR 6/1) clay with sand, moist, stiff. 5'	CL		1205	3.0'-5.0'		
		Dark gray (10YR 4/1) clay with sand, moist, stiff.			1225	8.0-10.0'		
	10	Total Depth - 10 ft						

Project: PBOW

Hole Number: CY1-SB03

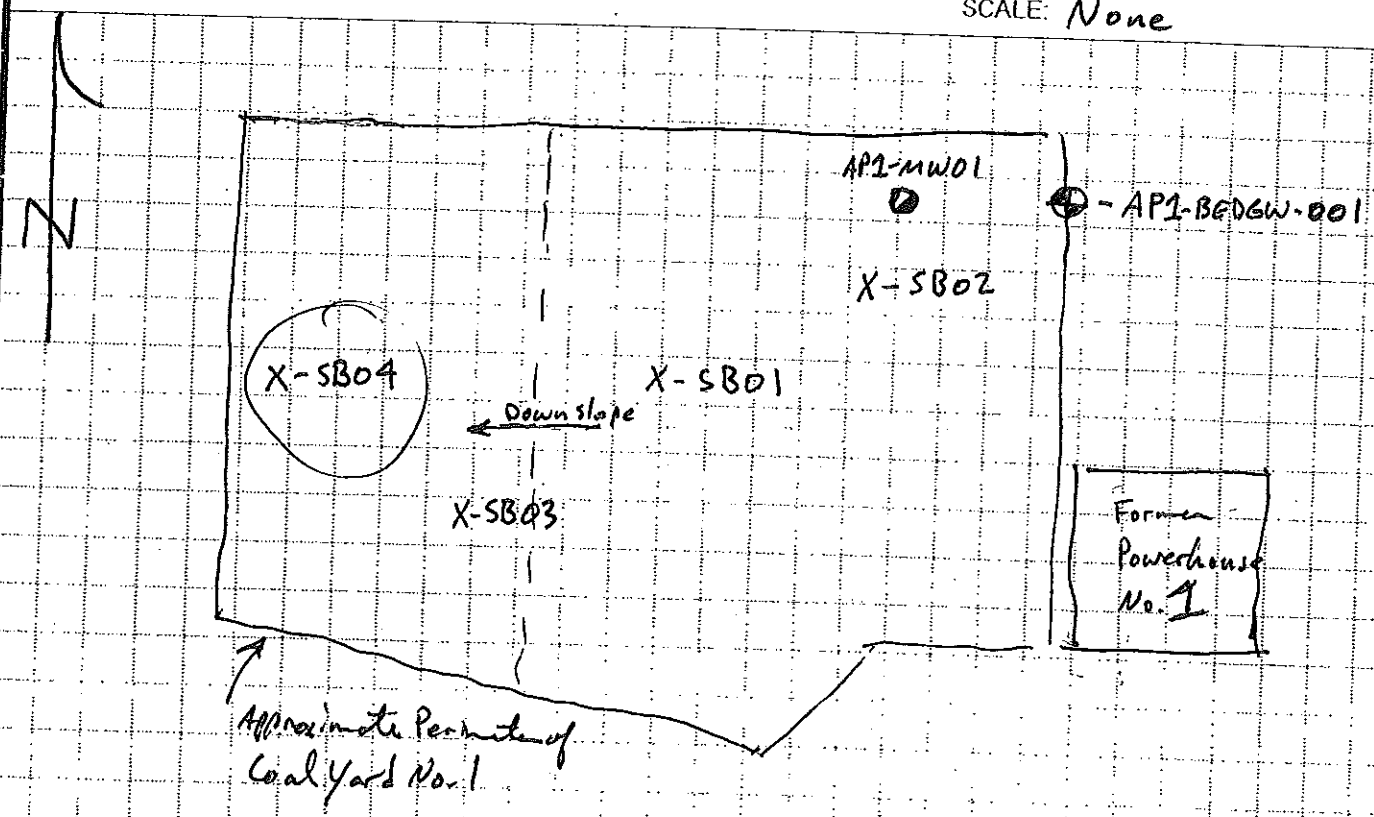
DEE

HTRW DRILLING LOG

DISTRICT	Nashville
HOLE NUMBER	CY1-SB04
SHEET / SHEETS	1 of 2
1. COMPANY NAME	Shaw E+I
2. DRILL SUBCONTRACTOR	NA
3. PROJECT	PBOW
4. LOCATION	Sandusky, Ohio
5. NAME OF DRILLER	NA
6. MANUFACTURER'S DESIGNATION OF DRILL	NA
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" Stainless Steel Bucket Auger; 3" Stainless Steel Bucket Auger
8. HOLE LOCATION	Coal Yard #1
9. SURFACE ELEVATION	636.46 N-623344.70 E-1918544.11
10. DATE STARTED	12-20-11
11. DATE COMPLETED	12-20-11
12. OVERBURDEN THICKNESS	>10'
13. DEPTH DRILLED INTO ROCK	0
14. TOTAL DEPTH OF HOLE	10
15. DEPTH GROUNDWATER ENCOUNTERED	None
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	—
DISTURBED	—
UNDISTURBED	—
19. TOTAL NUMBER OF CORE BOXES	—
20. SAMPLES FOR CHEMICAL ANALYSIS	✓
VOC	—
METALS	✓
OTHER (SPECIFY)	Explosives
OTHER (SPECIFY)	SVOC's
OTHER (SPECIFY)	PCB's
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE	
BACKFILLED	✓
MONITORING WELL	—
OTHER (SPECIFY)	—
23. SIGNATURE OF INSPECTOR	Eric W. Weaver

LOCATION SKETCH/COMMENTS

SCALE: None



PROJECT PBOW

HOLE NO. CY1-SB04

DKL

Shaw
Shaw E&I, Inc.

HTRW DRILLING LOG (continuation sheet)

Hole Number: CY1-SB04

Project: PBOW | Geologist: E. Weaver | Sheet 2 of 2 Sheets

Elev (ft)	Depth (ft) bgs	Description of Materials	USCS	Field Screening Results (ppm)	~~Geotech. Sample or Core Box No.~~	Analytical Sample No.	Recovery (ft)	Remarks
		Black (10YR 2/1) Silt with clay, coal, sand, moist, soft.	ML		Time			
	1					1.0'-2.0' CY0012		
		1.5'						
		Dark yellowish brown (10YR 4/6) fine grain sand with silt, moist, loose.	SM		1242			
	2							
	3	3'						
		Gray (10YR 6/1) clay with sand, moist, moist, stiff.	CL			3.0'-5.0' CY0013 CY0013MS CY0013MSD		
	4				1250			
	5	5'						
		Dark gray (10YR 4/1) clay with sand, moist, stiff.						
	6							
	7							
	8					8.0-10.0 CY0014		
	9				1340			
	10	Total Depth = 10 ft						

Project: PBOW | Hole Number: CY1-SB04

DKK

APPENDIX C

LAND SURVEY DATA

FINAL REPORT
of
SURVEYING SERVICES PERFORMED
by
SACKS SURVEYING & MAPPING, P.C. / KUSMER & ASSOCIATES J.V.
at the
PLUMBROOK ORDNANCE WORKS, SANDUSKY, OH
for
SHAW E & I
MAY - NOVEMBER, 2011

SUMMARY OF WORK PERFORMED

Between May, 2011 and November, 2011, Sacks Surveying & Mapping, PC, in joint venture with Kusmer & Associates, Inc., surveyed a total of 255 environmental sampling locations (soil samples, soil bores, test pits, sediment samples, piezometers, and monitoring wells) throughout the Plumbrook Ordnance Works facility. Surveying was performed over the course of three separate mobilizations, described more particularly as follows:

1st Mobilization (23-27 May, 2011) - 44 survey points: Unloading Area (12 points); Sellite Area (11 points); Wastewater Treatment Plant #2 site (10 points); and TNT C Sewer Line (11 points).
2ND Mobilization (26-30 September, 2011) – 176 survey points: Wastewater Treatment Plant #2 site (4 points); TNT C Sewer Line (3 points); Steel Sewer Line (40 points); Sellite Area (23 points); Unloading Area (3 points); TNT A Sewer Line (24 points); Ash Pit #3 (3 points); and Acid Area #1 (76 points).
3RD Mobilization (7-10 November, 2011) – 35 survey points: Acid Area #1 (12 points); Sellite Area (11 points); Coal Yard #1 (4 points); Coal yard 32 (4 points); and Coal Yard #3 (4 points)

Work was performed in accordance with Shaw E & I surveying specifications under purchase orders #680616-000 OP, 680686-000 OP, 680702-000 OP, and 680711-000 OP.

KEY PERSONNEL

W. Robert Kusmer – Ohio Land Surveyor S-6754
Stanley Robert Sacks – North Carolina Surveyor L-2913
Michael A. McKibbin – North Carolina Surveyor L-4519, Hazmat Project Manager
Jeff Bucholtz – On-site Party Chief *
Paul Lewis – Survey Technician *
* all on-site personnel for this project are OSHA 29 CFR 1910.120 40-hour trained and medically monitored in accordance with Shaw E & I requirements.

FIELD PROCEDURES

All sampling locations reported below were surveyed with a Topcon GTS-235 Total Station using conventional angle and distance measurements to determine the horizontal and vertical position thereof. Survey control used meets or exceeds the standards for a Third Order, Class II horizontal and Third Order vertical survey as defined in the Standards and Specifications for Geodetic Control Networks (1984). The survey control points used in this operation were established by this firm, presently or previously (January, 2009), by direct static differential GPS observation using three Ashtech Promark II GPS receivers with reference to NGS Monument

"Sky D" as a fixed horizontal reference and NGS Monument "J-318" (a first order benchmark) as a fixed vertical reference. The horizontal datum is NAD 83(1995). The vertical datum is NGVD 29. Values were scaled to the Ohio State Plane Coordinate System (North Zone) using a combined scale and ellipsoid factor of 0.999927034.

SKY D:	J-318:
Northing (y) 196,085.494 m	Northing (y) 196,170 m +/-
Easting (x) 586,761.658 m	Easting (x) 583,400 m +/-
Orthometric Elevation 175.30 m +/-	Orthometric Elevation 182.801 m
(SKYD not used as vertical control)	(First Order Class II NGVD 29 Benchmark)

CERTIFICATION

I, Warren Robert Kusmer, Ohio Professional Surveyor #S-6754, hereby certify that the information in this survey report is true to the best of my knowledge and belief.

W Robert Kusmer

Warren Robert Kusmer,
Ohio Professional Surveyor #S-6754

12/29/2011

Date

SAMPLE LOCATIONS:

Sellite Area (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
176	623869.42	1916750.44	637.70	636.3	PZ-01/SB-01
190	624014.07	1916719.34	635.50	633.5	PZ-02/SB-02
188	624020.14	1916786.02	635.51	632.9	PZ-03/SB-08
178	623929.48	1916752.25	639.51	636.6	PZ-04/SB-11
184	623934.02	1916892.19	634.43	633.7	PZ-05/SB-12
182	623872.51	1916884.23	634.37	633.8	PZ-06/SB-14
186	623895.85	1916986.31	634.44	632.9	PZ-07
193	623956.38	1916636.65	637.76	634.9	PZ-08
174	623798.08	1916683.07	636.59		SB-06
173	623786.75	1916777.79	636.27		SB-07
194	623888.92	1916843.75	636.95		SB-13

Sellite Area (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1351	623784.44	1916774.54	639.23	636.3	FSB MW-01
1339	623876.91	1916738.07	638.99	635.9	FSB MW-02
1335	624104.10	1916731.84	637.31	634.5	FSB MW-03
1341	624087.55	1916684.17	634.67		FSBSB-15
1347	623629.46	1917087.66	633.09		FSBSD-01
1346	623776.17	1917073.42	631.57		FSBSD-02
1365	623907.05	1917011.31	630.62		FSBSD-03
1364	624003.39	1916967.91	630.28		FSBSD-04
1362	624042.36	1916741.69	632.46		FSBSD-05
1363	623994.37	1916632.10	630.44		FSBSD-06
1357	623902.10	1916716.24	636.31		FSBSS-01
1359	623901.30	1916753.54	636.35		FSBSS-02
1358	623885.21	1916694.10	636.85		FSBSS-03
1360	623890.92	1916784.72	636.34		FSBSS-04
1356	623857.12	1916694.62	636.61		FSBSS-05
1361	623859.54	1916784.34	636.24		FSBSS-06
1355	623830.07	1916703.62	636.60		FSBSS-07
1354	623807.59	1916713.95	636.40		FSBSS-08
1353	623801.60	1916743.43	636.21		FSBSS-09
1352	623808.70	1916775.45	636.09		FSBSS-10
1445	623865.15	1916885.40	633.95		FSBTOC-01
1446	623932.91	1916885.13	633.99		FSBTOC-02
1447	624015.89	1916713.76	633.89		FSBTOC-03

Sellite Area (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1573	623883.26	1916668.05	637.11		SELSS-14
1575	623923.25	1916681.43	636.44		SELSS-15
1576	623943.21	1916722.42	636.04		SELSS-16
1577	623921.93	1916798.71	636.90		SELSS-17
1567	623853.57	1916821.88	636.27		SELSS-18
1568	623810.03	1916811.69	636.44		SELSS-19
1569	623759.95	1916739.76	636.59		SELSS-20
1566	623813.26	1916892.50	634.84		SELSS-21
1570	623813.21	1916632.33	637.07		SELSS-22
1571	623834.86	1916668.04	637.22		SELSS-23
1572	623890.63	1916627.56	636.31		SELSS-24

Unloading Area (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
165	623921.17	1917391.09	637.81	634.9	PZ-01/SB-01
163	623922.42	1917456.71	639.09	635.6	PZ-02/SB-04
151	623746.08	1917524.35	639.19	637.5	PZ-03/SB-11
154	623845.17	1917437.12	636.83	636.0	PZ-04/SB-02
161	623948.26	1917535.43	639.75	636.9	PZ-05
171	623948.78	1917093.30	634.92	633.9	PZ-06
169	623972.05	1917234.56	636.91	634.1	PZ-07
156	623752.04	1917199.54	633.98	633.3	PZ-08
166	623930.55	1917322.87	633.71		SB-06
167	623924.05	1917228.33	634.30		SB-07
170	623913.67	1917151.13	633.88		SB-09
152	623770.64	1917492.33	637.19		SB-12

Unloading Area (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1345	623759.93	1917202.98	636.19	633.2	ULA MW-01
1326	623917.73	1917163.13	636.97	633.9	ULA MW-02
1330	624017.95	1917082.01	636.80	633.7	ULA MW-03

Wastewater Treatment Plant #2 (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
554	623195.57	1911020.62	632.24	631.0	PZ-01
540	623108.02	1910684.85	641.47	638.4	PZ-02/SB-02
537	623144.69	1910827.50	640.32	637.8	PZ-03/SB-03
544	623058.08	1910992.40	633.38	631.7	PZ-04
549	623080.30	1910781.11	640.60	637.9	PZ-05/SB-05
564	622607.16	1910804.90	634.71	631.6	PZ-06/SB-06
541	623187.47	1910808.30	637.72		SB-01
538	623097.30	1910811.38	638.67		SB-04
542	623033.63	1910866.71	633.10		SB-07
550	622983.08	1910735.71	637.95		SB-08

Wastewater Treatment Plant #2 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1429	623207.36	1910619.96	644.37	641.7	WWTP2 MW-01
1433	623085.26	1910791.36	640.39	637.8	WWTP2 MW-02
1437	623147.10	1910834.46	640.06	637.5	WWTP2 MW-03
1441	623044.98	1910991.57	635.02	631.9	WWTP2 MW-04

TNT Area C Sewer Line (May 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
552	622788.18	1910747.40	637.23	634.8	PZ-01/SB-01
556	622453.95	1910931.11	634.16	631.7	PZ-02/SB-02
558	622398.23	1910961.31	633.76	631.2	PZ-03/SB-03
560	622308.19	1910977.84	632.98	631.0	PZ-04/SB-04
562	622256.01	1911033.31	637.05	634.5	PZ-05/SB-05
570	621987.34	1911159.29	642.27	640.6	PZ-06/SB-06
572	621977.78	1911141.29	642.43	640.5	PZ-07/SB-07
566	621963.90	1911117.11	643.00	641.1	PZ-08/SB-08
574	621870.49	1911217.73	642.81	641.4	PZ-09/SB-09
576	621787.53	1911234.38	643.08	641.1	PZ-10/SB-10
578	621653.06	1911296.36	643.26	641.0	PZ-11/SB-11

TNT Area C Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1419	622408.93	1910955.79	634.01	631.4	TNTCSL MW-01
1414	621962.33	1911149.14	643.24	640.4	TNTCSL MW-02
1410	621457.27	1911382.57	645.19	642.6	TNTCSL MW-03

Steel Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1314	624207.78	1918010.06	635.11	631.7	SSL MW-01
1715	622883.53	1915564.71	638.96	635.9	SSL MW-02
1403	622637.39	1912719.90	640.63	637.7	SSL MW-03
1303	623886.12	1919381.30	636.39		SSL-TP1
1302	624009.95	1919173.97	638.01		SSL-TP2
1301	624073.83	1919068.79	636.98		SSL-TP3
1309	624152.86	1918928.22	633.47		SSL-TP4
1308	624153.15	1918615.50	633.86		SSL-TP5
1307	624159.13	1918372.96	632.97		SSL-TP6
1310	624163.81	1918020.97	632.14		SSL-TP7
1318	624175.91	1917084.86	632.51		SSL-TP8
1319	624177.58	1916916.80	633.52		SSL-TP9
1368	623956.34	1916571.69	634.21		SSL-TP11
1371	623585.64	1916234.80	632.54		SSL-TP12
1716	622874.51	1915562.57	636.12		SSL-TP13
1719	622755.28	1915453.34	638.07		SSL-TP14
1722	622571.26	1915283.29	639.46		SSL-TP15
1723	622574.78	1915168.09	637.75		SSL-TP16
1394	622605.96	1913620.05	640.77		SSL-TP17
1404	622623.59	1912721.64	637.37		SSL-TP18
1405	622632.23	1912646.98	637.76		SSL-TP19
1406	622629.17	1912619.75	638.07		SSL-TP20
1422	622610.61	1911714.53	639.71		SSL-TP21
1421	622652.39	1911593.26	639.63		SSL-TP22
1420	622656.36	1911533.51	640.26		SSL-TP23
1423	622655.95	1911264.17	630.28		SSL-TP24
1424	622657.42	1911187.19	631.10		SSL-TP25
1425	622658.15	1911118.09	631.57		SSL-TP26
1444	622674.01	1910717.04	634.20		SSL-TP27
1443	622674.85	1910643.89	634.22		SSL-TP28
1442	622861.59	1910645.64	642.45		SSL-TP30
1300	623927.48	1919565.67	638.27		SSLUTL-01
1369	623778.12	1916411.67	636.87		SSLUTL-02
1370	623694.24	1916334.79	635.88		SSLUTL-03
1706	623047.03	1915726.29	634.04		SSLUTL-04
1707	622976.47	1915659.23	633.97		SSLUTL-05
1709	623104.14	1915779.14	638.54	636.2	SSL-PZ02
1710	622891.58	1915551.55	638.84	635.8	SSL-PZ03
1718	622800.09	1915490.11	640.81	638.3	SSL-PZ04
1721	622733.22	1915418.55	640.92	638.9	SSL-PZ05

TNT Area A Sewer Line (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1457	624602.74	1921705.79	628.82		SLSB-02
1471	624326.70	1922541.92	630.17		SLSB-05
1472	624321.95	1922542.98	630.72		SLSB-11
1473	624328.53	1922551.60	630.25		SLSB-12
1474	624331.64	1922540.29	630.69		SLSB-13
1475	624325.12	1922532.16	630.64		SLSB-14
1452	624603.71	1921686.40	628.85		SLSB-15
1453	624608.61	1921697.12	628.87		SLSB-16
1454	624600.16	1921695.20	628.85		SLSB-17
1455	624608.15	1921706.14	628.70		SLSB-18
1456	624598.59	1921705.76	629.12		SLSB-19
1458	624605.09	1921717.51	628.79		SLSB-20
1459	624595.56	1921714.41	628.80		SLSB-21
1460	624600.20	1921724.09	628.47		SLSB-22
1461	624321.46	1922512.67	630.73		SLSB-23
1462	624333.58	1922551.28	630.73		SLSB-24
1463	624323.74	1922552.17	630.74		SLSB-25
1464	624336.76	1922570.87	630.79		SLSB-26
1465	624331.95	1922571.35	630.29		SLSB-27
1466	624327.14	1922571.94	630.66		SLSB-28
1467	624340.09	1922589.79	630.68		SLSB-29
1468	624335.01	1922590.95	630.37		SLSB-30
1469	624330.01	1922591.43	630.57		SLSB-31
1470	624338.73	1922610.57	630.27		SLSB-32

Ash Pit #3 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1382	622910.53	1914684.10	638.03	638.5	AP3 MW-01
1379	622958.84	1914572.39	640.24	637.3	AP3 MW-02
1388	623077.56	1914421.69	639.28	636.2	AP3 MW-03

Acid Area #1 (September 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29) Adjacent Ground Elev.	Shaw Designation
1503	623078.28	1917106.10	638.42	AA1SS-01
1502	623076.73	1917171.83	638.44	AA1SS-02
1501	623075.70	1917246.79	638.55	AA1SS-03
1500	623039.17	1917293.39	638.66	AA1SS-04
1499	622984.40	1917293.03	638.45	AA1SS-05
1512	622954.08	1917229.01	639.05	AA1SS-06
1511	622955.77	1917164.58	639.23	AA1SS-07
1508	622956.83	1917089.10	639.38	AA1SS-08
1510	623001.76	1917066.77	638.34	AA1SS-09
1515	622887.69	1917172.92	639.32	AA1SS-10
1516	622907.05	1917233.67	639.03	AA1SS-11
1517	622881.62	1917304.26	637.83	AA1SS-12
1518	622814.45	1917329.70	638.00	AA1SS-13
1520	622707.29	1917340.43	638.81	AA1SS-14
1521	622704.30	1917231.64	639.59	AA1SS-15
1496	622975.86	1917587.10	638.45	AA1SS-16
1495	623037.08	1917589.53	637.75	AA1SS-17
1480	623064.78	1917704.91	639.12	AA1SS-18
1479	623065.08	1917637.67	638.31	AA1SS-19
1481	623061.83	1917804.59	638.68	AA1SS-20
1484	623034.78	1917834.69	638.79	AA1SS-21
1485	622967.39	1917835.92	638.45	AA1SS-22
1491	622930.15	1917771.74	639.63	AA1SS-23
1492	622932.71	1917708.65	639.61	AA1SS-24
1493	622932.60	1917633.33	639.48	AA1SS-25
1604	622853.23	1917648.95	637.16	AA1SS-26
1528	622885.14	1917706.18	638.86	AA1SS-27
1531	622854.06	1917806.49	638.63	AA1SS-28
1539	622847.55	1917891.08	638.74	AA1SS-29
1540	622856.20	1917976.35	638.90	AA1SS-30
1541	622842.99	1918045.69	638.99	AA1SS-31
1563	622887.57	1918118.44	639.50	AA1SS-32
1564	622871.73	1918216.54	639.13	AA1SS-33
1553	622718.83	1918169.12	639.00	AA1SS-34
1551	622689.36	1918097.34	639.17	AA1SS-35
1538	622734.26	1917941.52	638.97	AA1SS-36
1536	622731.20	1917882.54	638.98	AA1SS-37
1532	622745.39	1917809.30	639.30	AA1SS-38
1533	622743.92	1917731.23	639.22	AA1SS-39
1534	622680.36	1917678.76	638.85	AA1SS-40
1530	622763.83	1917641.77	637.77	AA1SS-41
1556	622682.28	1918569.02	640.38	AA1SS-42

Acid Area #1 (September 2011) <cont.>

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29) Adjacent Ground Elev.	Shaw Designation
1559	622763.35	1918563.10	639.48	AA1SS-43
1560	622863.21	1918513.54	639.33	AA1SS-44
1561	622877.63	1918588.87	640.14	AA1SS-45
1562	622835.66	1918657.90	641.27	AA1SS-46
1554	622762.05	1918053.62	639.05	AA1SS-47
1519	622766.70	1917335.77	638.24	AA1SS-48
1509	622993.80	1917064.17	634.75	AA1SS-49
1498	623073.71	1917303.80	638.33	AA1SS-50
1513	622960.42	1917323.23	634.30	AA1SS-51
1524	622880.86	1917372.21	636.65	AA1SS-52
1525	622817.11	1917387.41	636.81	AA1SS-53
1523	622718.26	1917391.44	637.72	AA1SS-54
1522	622654.66	1917361.08	639.01	AA1SS-55
1497	623070.51	1917436.15	638.27	AA1SS-56
1514	622976.12	1917448.41	635.40	AA1SS-57
1527	622789.91	1917432.10	636.82	AA1SS-58
1526	622860.52	1917484.11	636.20	AA1SS-59
1478	623066.03	1917555.87	638.37	AA1SS-60
1494	622947.89	1917558.68	639.17	AA1SS-61
1529	622821.39	1917639.93	637.26	AA1SS-62
1482	623057.97	1917895.33	638.61	AA1SS-63
1486	623007.09	1917906.72	637.40	AA1SS-64
1487	622973.47	1917899.89	637.77	AA1SS-65
1490	622942.18	1917877.79	638.98	AA1SS-66
1535	622691.85	1917886.00	639.52	AA1SS-67
1483	623053.10	1917979.40	638.31	AA1SS-68
1488	623006.56	1917959.29	636.95	AA1SS-69
1489	622941.52	1917963.82	638.03	AA1SS-70
1537	622690.45	1917944.62	639.31	AA1SS-71
1552	622678.71	1918186.89	638.95	AA1SS-72
1565	622869.25	1918282.09	638.99	AA1SS-73
1555	622685.10	1918492.13	640.51	AA1SS-74
1557	622618.06	1918574.96	640.05	AA1SS-75
1558	622699.47	1918653.16	640.08	AA1SS-76

Acid Area #1 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1596	622702.09	1917439.32	637.52		AA1SS-77
1595	622650.07	1917422.19	638.74		AA1SS-78
1598	622648.39	1917885.23	639.34		AA1SS-79
1597	622650.25	1917964.73	638.95		AA1SS-80
1600	622745.55	1918688.23	639.71		AA1SS-81
1601	622692.32	1918741.84	640.68		AA1SS-82
1602	622639.59	1918661.45	640.79		AA1SS-83
1592	623121.40	1917266.85	639.48		AA1SS-84
1591	623133.18	1917184.05	639.34		AA1SS-85
1594	622575.71	1917360.29	637.60		AA1SS-86
1599	622560.41	1917915.86	637.94		AA1SS-87
1603	622637.03	1918781.36	640.23		AA1SS-88

Coal Yard #1 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1586	623312.31	1918693.70	640.31		COAL1-SB01
1587	623317.59	1918784.80	640.42		COAL1-SB02
1589	623280.45	1918610.43	636.99		COAL1-SB03
1590	623344.70	1918544.11	636.46		COAL1-SB04

Coal Yard #2 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1585	623081.60	1911875.80	637.87		COAL2-SB01
1584	623034.37	1911903.68	638.12		COAL2-SB02
1582	623066.83	1911941.56	638.10		COAL2-SB03
1583	623069.44	1911988.57	637.94		COAL2-SB04

Coal Yard #3 (November 2011)

SS&M Pt. #	N(y) - NAD 83/95 Ohio State Plane	E(x) - NAD 83/95 North Zone	Elev (NGVD 29)	Adjacent Ground Elev.	Shaw Designation
1580	622941.18	1914858.88	639.33		COAL3-SB01
1578	622897.02	1914797.95	639.11		COAL3-SB02
1579	622921.16	1914832.59	639.18		COAL3-SB03
1581	622870.43	1914828.65	639.16		COAL3-SB04

APPENDIX D

INVESTIGATION-DERIVED WASTE MANIFEST

009108643JJK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OH3 800 015 379
2. Page 1 of 1
3. Emergency Response Phone: (800) 255-3924
4. Manifest Tracking Number: 009108643 JJK

5. Generator's Name and Mailing Address: NASA - PLUMBROOK STATION
6100 COLUMBUS AVE
SANDUSKY, OH 44870
Generator's Phone: (419) 621-3234

Generator's Site Address (if different than mailing address):
6100 COLUMBUS AVE
SANDUSKY, OH 44870

6. Transporter 1 Company Name: TRIAD TRANSPORT, INC.
U.S. EPA ID Number: OKD 981 588 791

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address: EQ DETROIT, INC.
1923 FREDERICK
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 566

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. NON DOT HAZARDOUS, NON RCRA REGULATED	35	DM	1800	G	029L
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
01. D098220DET / NON HAZARDOUS IDW WATER

NASA # N12002

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Robert F. Lallier Jr.
Signature: Robert Lallier on behalf of NASA GRC
Month 12 Day 26 Year 12

16. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Transporter signature (for exports only):
Port of entry/exit:
Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: MARK R. SMEALLIE
Signature: Mark R Smeallie
Month 1 Day 26 Year 12

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

18b. Alternate Facility (or Generator)
Manifest Reference Number:
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. LIW 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Julie Denzich
Signature:
Month 1 Day 10 Year 12

GENERATOR | INT'L | TRANSPORTER | DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

APPENDIX E

DATA VALIDATION SUMMARIES

Data Validation Summary Report
Coal Yard 1 Sampling December 2011
Former Plum Brook Ordnance Works
Sandusky, Ohio

1.0 Introduction

Level IV data validation was performed on 100 percent of the environmental soil samples collected for the December 2011 sampling events. The analytical data consisted of one sample delivery group (SDG) (F88938) analyzed by Accutest of Orlando, Florida. In addition, field split samples were collected and validated, one SDG (240-7168-1), was analyzed by Test America, and findings are discussed in Section 5.0 of this report.

The following samples were validated for this investigation:

SDG Number	Sample Number
F88938	CY0001, CY0002, CY0003, CY0004, CY0005, CY0006, CY0007, CY0008, CY0009, CY0011, CY0012, CY0013, CY0014
240-7168-1	CY0010

The chemical parameters for which the samples were analyzed are identified below:

Parameter (Prep/Analytical Method)
Semivolatile Organics by GC/MS SW846 3550C/8270D
Total and Dissolved Metals by SW846 3050B/6010C and 7471B
Nitroaromatic and Nitramine Explosives by SW846 8330A
PCBs by SW846 3550C/8082A
Wet Chemistry (TOC)

GC/MS - Gas chromatography/mass spectrometry. TOC - Total organic carbon.
PCB - Polychlorinated biphenyl.

2.0 Procedures

The sample data were validated following the logic identified in the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (January 2010) and the EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Review (June 2008) for all areas except blanks. EPA Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (April 1993) and Region 3 Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration (September 1994) were applied to the areas associated with blank contamination. Specific quality control (QC) criteria as identified in the quality assurance plan, analytical methods, and laboratory standard operating procedures were applied to all sample results. As a result of the use of Update III SW846 test methods for the analytical data and the application of the CLP guidelines during the validation process, there were instances where the specific QC requirements for all target compounds were not defined. This primarily occurred in the organic, GC/MS calibration areas and is due to the fact that the analytical methods are performance-based and allow the use of average calibration responses in lieu of individual responses, which are defined by CLP protocol. In light of

applying CLP guidelines to SW846 methods and evaluating the usability of the data during the validation process, specific QC criteria were determined to address all target compounds and are identified in this report for each parameter, as well as in the validation checklists, which function as worksheets. For those analytical methods not addressed by the CLP and Region 3 guidelines, the validation was based on the method requirements (i.e., SW846, Code of Federal Regulations, Standard Operating Procedures) and technical judgment, following the logic of the CLP validation guidelines. Laboratory-specific criteria may be found in Attachment A.

3.0 Summary of Data Validation Findings

The overall quality of the data was determined to be acceptable with minimal qualifications. An individual validation report has been prepared for the parameters analyzed, and the overall results of the validation findings are summarized in this report. A listing of the validation qualifiers and the reason codes, along with their definitions, is found in Attachment A. The following section highlights the key findings of the data validation process. No data were rejected.

4.0 Analysis-Specific Data Validation Summaries

4.1 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The initial calibration (ICAL) and continuing calibrations (CCAL) associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

Laboratory control sample (LCS) analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Internal Standards
All internal standards met QC criteria.

Quantitation
Results quantitated between the method detection limit (MDL) and the reporting limit (RL), which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.2 Total and Dissolved Metals by SW846 6010B/7470A/7471
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met with the following exceptions:

SDG Number	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc	J/UJ

Laboratory Duplicate Sample Analysis
A laboratory duplicate sample analysis was performed for the project samples, and all QC criteria were met with the following exceptions:

SDG Number	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Barium	J

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Interference Check Sample
All interference check sample percent recoveries were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples with the following exceptions:

SDG	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Aluminum, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Vanadium, Zinc	J

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified with the following exceptions:

SDG	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0008 (original), CY0009 (Field Duplicate)	Manganese	J

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "B," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.3 Nitroaromatic and Nitroamine Explosives by SW846 8330
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent relative percent difference [RPD]) were met.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.4 Polychlorinated Biphenyls by SW846 8082
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits for all the project samples.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
Original and field duplicate results were evaluated, and no problems were identified.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

4.5 Wet Chemistry (TOC)
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
All ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Duplicate Sample Analysis
A laboratory duplicate sample analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Field Duplicates
No original and field duplicate samples were analyzed for the wet chemistry parameters.

Quantitation
Results quantified between the MDL and RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.0 Quality Assurance Field Split Sample Data Evaluation

Data from the quality assurance split sample, CY0010 (SDG 240-7168-1), were validated. The field split sample was analyzed for semivolatiles by SW846 8270C, explosives by SW846 8330, PCBs by SW846 8280, and total and dissolved metals by SW 846 6010B and 7471A. The following section highlights the key findings of the data validation for each analysis.

The following samples were validated for this site investigation:

SDG Number	Sample Number
240-7168-1	CY0010

Sample/Field Duplicate/Field Split
CY0008 (Original) / CY0009 (Field Duplicate) / CY0010 (Field Split)

5.1 Semivolatile Organics by GC/MS SW846 8270C

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The ICAL and CCAL associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate

MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

LCS analysis was performed for the project samples, and all QC criteria were met.

Internal Standards

All internal standards met QC criteria.

Field Splits
Table 2 in Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.2 Total and Dissolved Metals by SW846 6010B/7470A/7471
Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times
Technical holding time criteria were met for all samples.

Sample Preservation
Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Interference Check Sample
All interference check sample percent recoveries were acceptable. All QC criteria were met.

Inductively Coupled Plasma Serial Dilutions
All QC criteria were met for the serial dilutions associated with the project samples.

Field Splits
Table 2 of Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "B," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

5.3 Nitroaromatic and Nitroamine Explosives by SW846 8330

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration

The ICAL and CCAL associated with the project samples met QC criteria.

Blanks

The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries

All surrogate recoveries were within QC limits for the project samples.

Matrix Spike/Matrix Spike Duplicate

MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample

LCS analysis was performed for the project samples, and all QC criteria were met.

Second Column Confirmation

Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Field Splits

Table 2 of Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation

Results quantitated between the MDL and the RL, which the laboratory qualified as “J,” were qualified as estimated (“J”) unless blank contamination was present or the results were rejected.

5.4 Polychlorinated Biphenyls by SW846 8082

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

Holding Times

Technical holding time criteria were met for all samples.

Sample Preservation

Sample preservation criteria were met for all samples.

Initial and Continuing Calibration
The ICAL and CCAL associated with the project samples met QC criteria.

Blanks
The 5X/10X rule for contaminants found in the associated equipment rinses, trip blanks, and method blanks was applied to all sample results. All were found to be acceptable.

Surrogate Recoveries
All surrogate recoveries were within QC limits.

Matrix Spike/Matrix Spike Duplicate
MS/MSD analysis was performed for the project samples, and all QC criteria were met.

Laboratory Control Sample
LCS analysis was performed for the project samples, and all QC criteria were met.

Second Column Confirmation
Samples having analytes with positive detects were verified on a second confirmation column; QC criteria (40 percent RPD) were met.

Field Splits
Table 2 in Appendix H shows the regular/field duplicate/field split comparison of the data. An RPD is calculated for the analytes that were positive detects.

Quantitation
Results quantitated between the MDL and the RL, which the laboratory qualified as "J," were qualified as estimated ("J") unless blank contamination was present or the results were rejected.

ATTACHMENT A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B						
Acetone	59 - 134	59 - 134	14	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	83 - 124	83 - 124	11	78 - 118	78 - 118	N/A
Bromobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromodichloromethane	76 - 116	76 - 116	10	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromoform	68 - 128	68 - 128	11	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	87 - 115	87 - 115	9	76 - 117	76 - 117	N/A
Chloroethane	54 - 166	54 - 166	20	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	85 - 123	85 - 123	10	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
Carbon disulfide	67 - 147	67 - 147	12	N/A	N/A	N/A
Carbon tetrachloride	74 - 139	74 - 139	13	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	82 - 127	82 - 127	10	N/A	N/A	N/A
1,1-Dichloroethylene	75 - 133	75 - 133	13	62 - 130	62 - 130	N/A
1,1-Dichloropropene	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane	76 - 122	76 - 122	11	N/A	N/A	N/A
1,2-Dichloropropane	81 - 120	81 - 120	11	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane	74 - 116	74 - 116	11	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	81 - 114	81 - 114	10	N/A	N/A	N/A
cis-1,3-Dichloropropene	83 - 119	83 - 119	10	N/A	N/A	N/A
trans-1,2-Dichloroethylene	82 - 126	82 - 126	10	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 123	87 - 123	10	N/A	N/A	N/A
Ethylbenzene	87 - 118	87 - 118	10	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	N/A	N/A	N/A
2-Hexanone	58 - 125	58 - 125	14	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Methyl-2-pentanone	62 - 125	62 - 125	13	N/A	N/A	N/A
Methyl bromide	55 - 151	55 - 151	21	N/A	N/A	N/A
Methyl chloride	55 - 173	55 - 173	22	N/A	N/A	N/A
Methylene chloride	69 - 125	69 - 125	11	N/A	N/A	N/A
Methyl ethyl ketone	61 - 127	61 - 127	13	N/A	N/A	N/A
Methyl tert-Butyl Ether	N/A	N/A	N/A	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A
n- Propylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Styrene	78 - 118	78 - 118	11	N/A	N/A	N/A
1,1,1-Trichloroethane	79 - 133	79 - 133	11	N/A	N/A	N/A
1,1.1,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	71 - 120	71 - 120	11	N/A	N/A	N/A
1,1,2-Trichloroethane	80 - 114	80 - 114	11	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	80 - 131	80 - 131	12	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	86 - 116	86 - 116	10	70 - 119	70 - 119	N/A
Trichloroethylene	85 - 124	85 - 124	10	62 - 130	62 - 130	N/A
Trichlorofluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	57 - 153	57 - 153	22	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
Xylene (total)	86 - 120	86 - 120	10	N/A	N/A	N/A
Surrogates						
Dibromofluoromethane	87 - 116	87 - 116	N/A	85-115	85-115	N/A
1,2-Dichloroethane-D4	76 - 127	76 - 127	N/A	70-120	70-120	N/A
Toluene-D8	86 - 112	86 - 112	N/A	85-120	85-120	N/A
4-Bromofluorobenzene	84 - 120	84 - 120	N/A	75-120	75-120	N/A
Semivolatile Organic Compounds, SW-846 8270C						
Benzoic Acid	10 - 50	10 - 50	40	N/A	N/A	N/A
2-Chlorophenol	44 - 103	44 - 103	29	27 - 110	27 - 110	30
4-Chloro-3-methyl phenol	53 - 105	53 - 105	24	39 - 110	39 - 110	30
2,4-Dichlorophenol	53 - 108	53 - 108	26	N/A	N/A	N/A
2,4-Dimethylphenol	37 - 91	37 - 91	28	N/A	N/A	N/A
2,4-Dinitrophenol	37 - 111	37 - 111	30	N/A	N/A	N/A
4,6-Dinitro-o-cresol	62 - 115	62 - 115	26	N/A	N/A	N/A
2-Methylphenol	35 - 91	35 - 91	30	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A	N/A
3&4-Methylphenol	32 - 85	32 - 85	29	N/A	N/A	N/A
2-Nitrophenol	49 - 111	49 - 111	30	N/A	N/A	N/A
4-Nitrophenol	13 - 55	13 - 55	31	12 - 130	12 - 130	30
Pentachlorophenol	57 118	57 118	26	26 - 110	26 - 110	30
Phenol	13 - 54	13 - 54	34	14 - 112	14 - 112	30
2,4,5-Trichlorophenol	59 - 106	59 - 106	23	N/A	N/A	N/A
2,4,6-Trichlorophenol	58 - 107	58 - 107	24	N/A	N/A	N/A
Acenaphthene	58 - 106	58 - 106	21	40 - 110	40 - 110	30
Acenaphthylene	58 - 105	58 - 105	21	N/A	N/A	N/A
Anthracene	65 - 108	65 - 108	19	N/A	N/A	N/A
Benzo(a)anthracene	63 - 111	63 - 111	19	N/A	N/A	N/A
Benzo(a)pyrene	62 - 106	62 - 106	20	N/A	N/A	N/A
Benzo(b)fluoranthene	63 - 109	63 - 109	20	N/A	N/A	N/A
Benzo(g,h,i)perylene	61 - 111	61 - 111	21	N/A	N/A	N/A
Benzo(k)fluoranthene	64 - 111	64 - 111	20	N/A	N/A	N/A
4-Bromophenol phenyl ether	64 - 107	64 - 107	20	N/A	N/A	N/A
Butyl benzyl phthalate	59 - 114	59 - 114	20	N/A	N/A	N/A
Benzyl Alcohol	34 - 98	34 - 98	27	N/A	N/A	N/A
2-Chloronaphthalene	54 - 105	54 - 105	24	N/A	N/A	N/A
4-Chloroaniline	53 - 103	53 - 103	22	N/A	N/A	N/A
Carbazole	66 - 109	66 - 109	20	N/A	N/A	N/A
Chrysene	64 - 111	64 - 111	19	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	48 - 101	48 - 101	28	N/A	N/A	N/A
bis(2-Chloroethyl)ether	51 - 108	51 - 108	27	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	43 - 106	43 - 106	27	N/A	N/A	N/A
4-Chlorophenyl pheny ether	61 - 107	61 - 107	20	N/A	N/A	N/A
1,2-Dichlorobenzene	41 - 102	41 - 102	28	N/A	N/A	N/A
1,3-Dichlorobenzene	38 - 100	38 - 100	28	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,4-Dichlorobenzene	40 - 100	40 - 100	28	19 - 110	19 - 110	30
2,4-Dinitrotoluene	60 - 109	60 - 109	20	52 - 123	52 - 123	30
2,6-Dinitrotoluene	58 - 104	58 - 104	21	N/A	N/A	N/A
3,3'-Dichlorobenzidine	57 - 105	57 - 105	25	N/A	N/A	N/A
Dibenzo(a,h)antracene	62 - 112	62 - 112	20	N/A	N/A	N/A
Dibenzofuran	61 - 108	61 - 108	20	N/A	N/A	N/A
Di-n-butyl phthalate	62 - 109	62 - 109	20	N/A	N/A	N/A
Di-n-octyl phthalate	60 - 120	60 - 120	24	N/A	N/A	N/A
Diethyl phthalate	62 - 109	62 - 109	19	N/A	N/A	N/A
Dimethyl phthalate	63 - 106	63 - 106	19	N/A	N/A	N/A
Diphenylamine	N/A	N/A	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	59 - 116	59 - 116	21	N/A	N/A	N/A
Fluoranthene	65 - 114	65 - 114	21	N/A	N/A	N/A
Fluorene	61 - 106	61 - 106	19	N/A	N/A	N/A
Hexachlorobenzene	62 - 107	62 - 107	20	N/A	N/A	N/A
Hexachlorobutadiene	38 - 107	38 - 107	30	N/A	N/A	N/A
Hexachlorocyclopentadiene	19 - 84	19 - 84	35	N/A	N/A	N/A
Hexachloroethane	35 - 101	30 - 101	29	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	61 - 113	61 - 113	20	N/A	N/A	N/A
Isophorone	56 - 111	56 - 111	26	N/A	N/A	N/A
2-Metlhyl-4,6-dinitrophenol	N/A	N/A	N/A	N/A	N/A	N/A
2-Methylnaphthalene	56 - 112	56 - 112	26	N/A	N/A	N/A
2-Nitroaniline	60 - 109	60 - 109	20	N/A	N/A	N/A
3-Nitroaniline	52 - 107	52 - 107	21	N/A	N/A	N/A
4-Nitroaniline	59 - 111	59 - 111	21	N/A	N/A	N/A
Naphthalene	50 - 104	50 - 104	28	N/A	N/A	N/A
Nitrobenzene	52 - 105	52 - 105	28	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	51 - 104	51 - 104	28	37 - 121	37 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine	57 - 110	57 - 110	19	N/A	N/A	N/A
Phenanthrene	65 - 108	65 - 108	20	N/A	N/A	N/A
Pyrene	60 - 113	60 - 113	20	55 - 120	55 - 120	30
1,2,4-Trichlorobenzene	45 - 104	45 - 104	28	25 - 110	25 - 110	30
Surrogates						
2-Fluorophenol	14 - 62	14 - 62	N/A	20-110	20-110	N/A
Phenol-d5	10 - 40	10 - 40	N/A	10-115	10-115	N/A
2,4,6-Tribromophenol	33 - 118	33 - 118	N/A	40-125	40-125	N/A
Nitrobenzene-d5	42 - 108	42 - 108	N/A	40-110	40-110	N/A
2-Fluorobiphenyl	40 - 106	40 - 106	N/A	50-110	50-110	N/A
Terphenyl-d14	39 - 121	39 - 121	N/A	50-135	50-135	N/A
Nitroaromatics and Nitroamines, SW-846 8330						
HMX	74 - 152	74 - 152	21	80 - 115	80 - 115	30
RDX	80 - 124	80 - 124	20	50 - 160	50 - 160	30
1,3-Dinitrobenzene	84 - 123	84 - 123	23	45 - 160	45 - 160	30
2,6-Dinitrotoluene	84 - 133	84 - 133	23	60 - 135	60 - 135	30
2,4-Dinitrotoluene	77 - 116	77 - 116	26	60 - 135	60 - 135	30
2-amino-4,6-Dinitrotoluene	78 - 117	78 - 117	28	55 - 155	55 - 155	30
4-amino-2,6-Dinitrotoluene	84 - 123	84 - 123	27	55 - 155	55 - 155	30
Nitrobenzene	76 - 128	76 - 128	28	50 - 140	50 - 140	30
o-Nitrotoluene	76 - 120	76 - 120	30	50 - 130	50 - 130	30
m-Nitrotoluene	74 - 124	74 - 124	32	45 - 135	45 - 135	30
p-Nitrotoluene	81 - 125	81 - 125	34	50 - 130	50 - 130	30
Tetryl	62 - 117	62 - 117	28	20 - 175	20 - 175	30
1,3,5-Trinitrobenzene	85 - 127	85 - 127	21	65 - 140	65 - 140	30
2,4,6-Trinitrotoluene	71 - 128	71 - 128	21	50 - 145	50 - 145	30
Nitroglycerin	N/A	N/A	N/A	76 - 116	76 - 116	30
PETN	N/A	N/A	N/A	69 - 117	69 - 117	30
Surrogate						

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America Laboratories, Inc.		
	Water - LCS	Water - MS/MSD		Water - LCS	Water - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
3,4-Dinitrotoluene	70 - 136	70 - 136	N/A	79-111	79-111	N/A
PCBs, SW-846 8082						
Aroclor-1016	76 - 117	76 - 117	16	44 - 119	10 - 199	30
Aroclor-1260	65 - 117	65 - 117	23	41 - 118	10 - 199	30
Surrogates						
Tetrachloro-m-xylene	38 - 127	38 - 127	N/A	27-130	27-130	N/A
Decachlorobiphenyl	25 - 137	25 - 137	N/A	10-127	10-127	N/A
Metals, SW-846 6010B/6020A/7470A						
Aluminum	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Water Quality						
Chloride	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Hardness as CaCO3	N/A	N/A	N/A	88 - 110	87 - 114	20
Nitrate	90 - 110	90 - 110	20	90 - 110	34 - 125	20
Sulfate	90 - 110	90 - 110	20	90 - 110	80 - 120	20
Total Alkalinity	90 - 113	90 - 113	20	90 - 127	10 - 160	24
Total Cyanide	90 - 110	90 - 110	20	69 - 118	42 - 140	20
Total Dissolved Solids	N/A	N/A	5	88 - 110	N/A	20
Total Suspended Solids	N/A	N/A	5	73 - 113	N/A	20
Turbidity	N/A	N/A	8	75 - 125	N/A	20

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Volatile Organic Compounds, SW846 8260B						
Acetone	61 - 144	61 - 144	29	N/A	N/A	N/A
Acrolein	N/A	N/A	N/A	N/A	N/A	N/A
Acrylonitrile	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	78 - 130	78 - 130	25	75 - 129	75 - 129	N/A
Bromobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Bromochloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Bromodichloromethane	73 - 122	73 - 122	25	N/A	N/A	N/A
Bromoform	70 - 139	70 - 139	26	N/A	N/A	N/A
Bromomethane	N/A	N/A	N/A	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	83 - 122	83 - 122	23	75 - 127	75 - 127	N/A
Chloroethane	61 - 153	61 - 153	31	N/A	N/A	N/A
Chloromethane	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	79 - 129	79 - 129	27	N/A	N/A	N/A
2-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorotoluene	N/A	N/A	N/A	N/A	N/A	N/A
Carbon disulfide	61 - 142	61 - 142	27	N/A	N/A	N/A
Carbon tetrachloride	79 - 135	79 - 135	29	N/A	N/A	N/A
1,2-Dibromoethane	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dibromo-3-chloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	77 - 132	77 - 132	26	N/A	N/A	N/A
1,1-Dichloroethylene	66 - 132	66 - 132	27	55 - 142	55 - 142	N/A
1,2-Dichloroethane	78 - 129	78 - 129	24	N/A	N/A	N/A
1,2-Dichloropropane	74 - 127	74 - 127	27	N/A	N/A	N/A
1,3-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
2,2-Dichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloropropene	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
Dibromochloromethane	78 - 117	78 - 117	27	N/A	N/A	N/A
Dibromomethane	N/A	N/A	N/A	N/A	N/A	N/A
Dichlorodifluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	74 - 123	74 - 123	26	N/A	N/A	N/A
cis-1,3-Dichloropropene	79 - 130	79 - 130	23	N/A	N/A	N/A
trans-1,2-Dichloroethylene	77 - 129	77 - 129	27	N/A	N/A	N/A
trans-1,3-Dichloropropene	87 - 131	87 - 131	27	N/A	N/A	N/A
Ethylbenzene	82 - 124	82 - 124	25	N/A	N/A	N/A
2-Hexanone	67 - 130	67 - 130	29	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	N/A	N/A	N/A
Isopropylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
4-Isopropyltoluene	N/A	N/A	N/A	N/A	N/A	N/A
4-Methyl-2-pentanone	69 - 125	69 - 125	24	N/A	N/A	N/A
Methyl bromide	60 - 146	60 - 146	31	N/A	N/A	N/A
Methyl chloride	58 - 163	58 - 163	26	N/A	N/A	N/A
Methylene chloride	62 - 140	62 - 140	25	N/A	N/A	N/A
Methyl ethyl ketone	66 - 134	66 - 134	23	N/A	N/A	N/A
Methyl tert-Butyl ether	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A
n-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
n-Propylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Styrene	79 - 123	79 - 123	28	N/A	N/A	N/A
sec-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1-Trichloroethane	80 - 133	80 - 133	27	N/A	N/A	N/A
1,2,3-Trichloropropane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	70 - 128	70 - 128	30	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,1,2-Trichloroethane	76 - 118	76 - 118	28	N/A	N/A	N/A
1,3,5-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
tert-Butylbenzene	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	79 - 132	79 - 132	27	N/A	N/A	N/A
Toluene	80 - 123	80 - 123	26	71 - 130	71 - 130	N/A
Trichloroethylene	78 - 132	78 - 132	28	70 - 131	70 - 131	N/A
Trichlorofluoromethane	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl chloride	60 - 145	60 - 145	29	N/A	N/A	N/A
m-Xylene/p-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene	N/A	N/A	N/A	N/A	N/A	N/A
Xylene (total)	83 - 127	83 - 127	24	N/A	N/A	N/A
Surrogates						
Dibromofluoromethane	80 - 121	80 - 121	N/A	68-110	68-110	N/A
Toluene-D8	71 - 130	71 - 130	N/A	69-128	69-128	N/A
4-Bromofluorobenzene	59 - 148	59 - 148	N/A	64-130	64-130	N/A
1,2-Dichloroethane-D4	77 - 123	77 - 123	N/A	64-130	64-130	N/A
Semivolatile Organic Compounds, SW-846 8270C						
Benzoic Acid	44 - 116	44 - 116	36	N/A	N/A	N/A
2-Chlorophenol	54 - 97	54 - 97	31	32 - 110	32 - 110	30
4-Chloro-3-methyl phenol	59 - 102	59 - 102	27	32 - 117	32 - 117	30
2,4-Dichlorophenol	60 - 101	60 - 101	30	N/A	N/A	N/A
2,4-Dimethylphenol	49 - 89	49 - 89	31	N/A	N/A	N/A
2,4-Dinitrophenol	39 - 107	39 - 107	40	N/A	N/A	N/A
4,6-Dinitro-o-cresol	58 - 109	58 - 109	37	N/A	N/A	N/A
2-Methylphenol	53 - 94	53 - 94	29	N/A	N/A	N/A
3&4-Methylphenol	54 - 95	54 - 95	31	N/A	N/A	N/A
4-Methylphenol	N/A	N/A	N/A	N/A	N/A	N/A
2-Nitrophenol	55 - 96	55 - 96	30	N/A	N/A	N/A
4-Nitrophenol	56 - 106	56 - 106	29	10 - 125	10 - 125	30
Pentachlorophenol	50 - 115	50 - 115	33	10 - 182	10 - 182	30
Phenol	55 - 99	55 - 99	28	10 - 144	10 - 144	30
2,4,5-Trichlorophenol	60 - 101	60 - 101	28	N/A	N/A	N/A
2,4,6-Trichlorophenol	60 - 100	60 - 100	27	N/A	N/A	N/A
Acenaphthene	59 - 97	59 - 97	29	10 - 200	10 - 200	30
Acenaphthylene	58 - 98	58 - 98	30	N/A	N/A	N/A
Anthracene	61 - 104	61 - 104	29	N/A	N/A	N/A
Benzo(a)anthracene	60 - 106	60 - 106	31	N/A	N/A	N/A
Benzo(a)pyrene	59 - 102	59 - 102	32	N/A	N/A	N/A
Benzo(b)fluoranthene	60 - 107	60 - 107	31	N/A	N/A	N/A
Benzo(g,h,i)perylene	56 - 103	56 - 103	32	N/A	N/A	N/A
Benzo(k)fluoranthene	61 - 107	61 - 107	30	N/A	N/A	N/A
4-Bromophenol phenyl ether	60 - 104	60 - 104	26	N/A	N/A	N/A
Butyl benzyl phthalate	57 - 110	57 - 110	28	N/A	N/A	N/A
Benzyl Alcohol	N/A	N/A	N/A	N/A	N/A	N/A
Butyl Alcohol	51 - 102	51 - 102	34	N/A	N/A	N/A
2-Chloronaphthalene	57 - 95	57 - 95	28	N/A	N/A	N/A
4-Chloroaniline	19 - 85	19 - 85	34	N/A	N/A	N/A
Carbazole	60 - 106	60 - 106	30	N/A	N/A	N/A
Chrysene	60 - 107	60 - 107	31	N/A	N/A	N/A
bis(2-Chloroethyoxy)methane	51 - 89	51 - 89	30	N/A	N/A	N/A
bis(2-Chloroethyl)ether	50 - 96	50 - 96	33	N/A	N/A	N/A
bis(2-Chloroisopropyl)ether	44 - 94	44 - 94	32	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	60 - 101	60 - 101	26	N/A	N/A	N/A
1,2-Dichlorobenzene	47 - 91	47 - 91	35	N/A	N/A	N/A

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
1,3-Dichlorobenzene	45 - 86	45 - 86	36	N/A	N/A	N/A
1,4-Dichlorobenzene	45 - 88	45 - 88	36	26 - 110	26 - 110	30
2,4-Dinitrotoluene	59 - 103	59 - 103	30	42 - 118	42 - 118	30
2,6-Dinitrotoluene	57 - 99	57 - 99	30	N/A	N/A	N/A
3,3'-Dichlorobenzidine	34 - 88	34 - 88	31	N/A	N/A	N/A
Dibenzo(a,h)antracene	57 - 105	57 - 105	29	N/A	N/A	N/A
Dibenzofuran	58 - 103	58 - 103	27	N/A	N/A	N/A
Di-n-butyl phthalate	59 - 105	59 - 105	27	N/A	N/A	N/A
Di-n-octyl phthalate	59 - 117	59 - 117	28	N/A	N/A	N/A
Diethyl phthalate	59 - 106	59 - 106	27	N/A	N/A	N/A
Dimethyl phthalate	60 - 100	60 - 100	26	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	57 - 111	57 - 111	29	N/A	N/A	N/A
Fluoranthene	60 - 110	60 - 110	32	N/A	N/A	N/A
Fluorene	60 - 99	60 - 99	30	N/A	N/A	N/A
Hexachlorobenzene	58 - 103	58 - 103	27	N/A	N/A	N/A
Hexachlorobutadiene	49 - 95	49 - 95	33	N/A	N/A	N/A
Hexachlorocyclopentadiene	36 - 94	36 - 94	41	N/A	N/A	N/A
Hexachloroethane	44 - 89	44 - 89	38	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	57 - 104	57 - 104	33	N/A	N/A	N/A
Isophorone	58 - 97	58 - 97	30	N/A	N/A	N/A
2-Methylnaphthalene	57 - 103	57 - 103	32	N/A	N/A	N/A
2-Nitroaniline	53 - 106	53 - 106	29	N/A	N/A	N/A
3-Nitroaniline	29 - 85	29 - 85	31	N/A	N/A	N/A
4-Nitroaniline	49 - 104	49 - 104	31	N/A	N/A	N/A
Naphthalene	54 - 93	54 - 93	32	N/A	N/A	N/A
Nitrobenzene	53 - 92	53 - 92	32	N/A	N/A	N/A
N-Nitroso-di-n-propylamine	49 - 94	49 - 94	28	30 - 121	30 - 121	30
N-Nitrosodimethylamine	N/A	N/A	N/A	N/A	N/A	N/A
N-Nitrosodiphenylamine	53 - 107	53 - 107	28	N/A	N/A	N/A
Phenanthrene	61 - 103	61 - 103	32	N/A	N/A	N/A
Pyrene	58 - 109	58 - 109	33	10 - 200	10 - 200	30
Diphenylamine	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	52 - 93	52 - 93	32	33 - 110	33 - 110	30
Surrogates						
2-Fluorophenol	40 - 102	40 - 102	N/A	35-105	35-105	N/A
Phenol-d5	41 - 100	41 - 100	N/A	40-100	40-100	N/A
2,4,6-Tribromophenol	42 - 108	42 - 108	N/A	35-125	35-125	N/A
Nitrobenzene-d5	40 - 105	40 - 105	N/A	35-100	35-100	N/A
2-Fluorobiphenyl	43 - 107	43 - 107	N/A	45-105	45-105	N/A
Terphenyl-d14	45 - 119	45 - 119	N/A	30-125	30-125	N/A
Nitroaromatics and Nitroamines, SW-846 8330						
HMX	75 - 156	75 - 156	27	75 - 125	75 - 125	N/A
RDX	77 - 131	77 - 131	28	70 - 135	70 - 135	N/A
1,3-Dinitrobenzene	82 - 134	82 - 134	20	80 - 125	80 - 125	N/A
2,6-Dinitrotoluene	86 - 142	86 - 142	17	80 - 120	80 - 120	N/A
2,4-Dinitrotoluene	74 - 129	74 - 129	18	80 - 125	80 - 125	N/A
2-amino-4,6-Dinitrotoluene	83 - 123	83 - 123	22	80 - 125	80 - 125	N/A
4-amino-2,6-Dinitrotoluene	85 - 137	85 - 137	18	80 - 125	80 - 125	N/A
Nitrobenzene	82 - 138	82 - 138	19	75 - 125	75 - 125	N/A
o-Nitrotoluene	85 - 129	85 - 129	21	75 - 120	75 - 120	N/A
m-Nitrotoluene	85 - 136	85 - 136	22	80 - 125	80 - 125	N/A
p-Nitrotoluene	86 - 133	86 - 133	19	75 - 125	75 - 125	N/A
Tetryl	53 - 124	53 - 124	22	10 - 150	10 - 150	N/A
1,3,5-Trinitrobenzene	81 - 138	81 - 138	24	75 - 125	75 - 125	N/A
2,4,6-Trinitrotoluene	70 - 137	70 - 137	29	55 - 140	55 - 140	N/A
Surrogates						
3,4-Dinitrotoluene	72 - 145	72 - 145	N/A	78-108	78-108	N/A
PCBs, SW-846 8082						

Laboratory Control Limits for QC Samples
Plum Brook Ordnance Works
Sandusky, Ohio

Spiked Compound	Accutest			Test America		
	Soil - LCS	Soil - MS/MSD		Soil - LCS	Soil - MS/MSD	
	% Recovery Range	% Recovery Range	Precision RPD (%)	% Recovery Range	% Recovery Range	Precision RPD (%)
Aroclor-1016	69 - 117	69 - 117	26	10 - 199	10 - 199	30
Aroclor-1260	71 - 121	71 - 121	30	10 - 199	10 - 199	30
Surrogates						
Tetrachloro-m-xylene	44 - 126	44 - 126	N/A	40-140	40-140	N/A
Decachlorobiphenyl	39 - 157	39 - 157	N/A	60-125	60-125	N/A
Metals, SW-846 6010B/7470A						
Aluminum	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Antimony	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Arsenic	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Barium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Beryllium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cadmium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Calcium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Chromium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Cobalt	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Copper	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Iron	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Lead	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Magnesium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Manganese	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Nickel	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Potassium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Selenium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Silver	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Sodium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Thallium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Vanadium	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Zinc	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Mercury	80 - 120	80 - 120	20	80 - 120	75 - 125	20
Total Organic Carbon (TOC) SW-846 9060						
TOC			25			

LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RPD - Relative Percent Difference
N/A - Not Applicable

APPENDIX F

CHEMICAL ANALYTICAL DATA SUMMARY

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Explosives																									
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrobenzene, 1,3-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrotoluene, 2,4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Dinitrotoluene, 2,6-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
HMX	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrobenzene	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 2-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 3-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Nitrotoluene, 4-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
RDX	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Tetryl	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.19	U	U	0.15	U	U	0.19	U	U	0.16	U	U	0.16	U	U	0.15	U	U	0.17	U	U	0.17	U	U
Semivolatiles																									
3-Methylphenol and 4-Methylph	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Acenaphthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Acenaphthylene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
ACETOPHENONE	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Atrazine	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(a)pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(b)fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(ghi)perylene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzo(k)fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Benzoic acid	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Benzyl alcohol	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
BIBENZENE	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Butyl benzyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Caprolactam	mg/kg	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloroaniline, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chloronaphthalene, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chlorophenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Chrysene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dibenz(a,h)anthracene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dibenzofuran	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.103	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Diethyl phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dimethyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Di-n-butyl phthalate	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	U	U	0.43	U	U	0.43	U	U	0.41	U	U	1.7	U	U	0.42	U	U	0.4	U	U	0.43	U	U
Dinitrophenol, 2,4-	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Di-n-octyl phthalate	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Fluoranthene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.138	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Fluorene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.105	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorobenzene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorobutadiene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Hexachloroethane	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Isophorone	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Methylnaphthalene, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.0264	J	J	0.21	U	U
Methylphenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Naphthalene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitroaniline, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitroaniline, 3-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nitroaniline, 4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrobenzene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrophenol, 2-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Nitrophenol, 4-	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pentachlorophenol	mg/kg	1	U	U	1.1	U	U	1.1	U	U	1	U	U	4.2	U	U	1	U	U	0.99	U	U	1.1	U	U
Phenanthrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Phenol	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pyrene	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.124	J	J	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	U	U	0.21	U	U	0.21	U	U	0.2	U	U	0.84	U	U	0.21	U	U	0.2	U	U	0.21	U	U
Pesticides/PCBs																									
Aroclor 1016	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1221	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1232	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1242	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1248	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1254	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Aroclor 1260	mg/kg	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U	-	-	-	0.02	U	U	0.021	U	U
Metals - Unfiltered																									
Aluminum	mg/kg	4660			10100			11000			2030			6020			9910			5020			11400		
Antimony	mg/kg	0.12	B	J	2.1	U	U	2	U	U	0.14	B	J	0.23	B	J	5.3	U	U	1.2	U	U	1.9	U	U
Arsenic	mg/kg	3.1			7.9			8.4			34.6			3.8			7			9			12.5		
Barium	mg/kg	18.5			73.8			79.7			23.9			44			62.7			31.6			84.6		
Beryllium	mg/kg	0.24	B	J	0.52			0.58			0.061	B	J	0.5			0.62	B	J	0.32			0.63		
Cadmium	mg/kg	0.21	U	U	0.15	B	J	0.33	B	J	0.16	U	U	0.52			0.46	B	J	0.17	B	J	0.33	B	J
Calcium	mg/kg	727			5470			13800			447			4140			3230			2340			3110		
Chromium	mg/kg	7.8			15.4			17.1			3.9			10.7			15.3			8.7			17.8		
Cobalt	mg/kg	3.1			8.3			18			0.79	B	J	9.5			14.1			3.3			14.1		
Copper	mg/kg	6			19.4			24.9			3.3			18.3			18.1			7.5			24.8		
Iron	mg/kg	8320			18800			22300			7840			17300			17100			12700			26000		
Lead	mg/kg	4.8			10.7			11.8			5.5			29.8			10.3			7.2			12.8		
Magnesium	mg/kg	614			3710			6100			274			1180			2260			1090			3950		
Manganese	mg/kg	30.6			316			721			23.7			188			401			148			230		J
Mercury	mg/kg	0.013	B	J	0.021	B	J	0.019	B	J	0.022	B	J	0.037	B	J	0.076	B	J	0.034	B	J	0.02	B	J

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

	Location Code:	CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03		
	Sample Number:	CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008		
	Sample Date:	20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
	Sample Depth:	0.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			0.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			0.5 - 1.5 Ft			3 - 5 Ft		
	Sample Purpose:	REG			REG			REG			REG			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nickel	mg/kg	7.8			23.1			36			2.3			13.6			34.1			9.4			37.2		
Potassium	mg/kg	212	B	J	744	B	J	1550			202	B	J	435	B	J	770	B	J	400	B	J	1390		
Selenium	mg/kg	1.1	U	U	2.1	U	U	0.53	B	J	0.82	U	U	1.2	U	U	5.3	U	U	1.2	U	U	1.9	U	U
Silver	mg/kg	0.53	U	U	1	U	U	0.98	U	U	0.41	U	U	0.62	U	U	2.7	U	U	0.6	U	U	0.97	U	U
Sodium	mg/kg	530	U	U	1000	U	U	980	U	U	111	B	J	620	U	U	2700	U	U	111	B	J	970	U	U
Thallium	mg/kg	0.53	U	U	0.52	U	U	0.29	B	J	0.41	U	U	0.62	U	U	0.53	U	U	0.6	U	U	0.41	B	J
Vanadium	mg/kg	15.4			25.2			21.8			8			18.1			18.7			16.6			23.2		
Zinc	mg/kg	21.3			43.9			57.6			9.4			157			163			21.1			57		
General Chemistry																									
% Solids	Percent	83.3			78.7			76.9			83.1			79.7			79.8			82.9			78.2		
Total organic carbon	Percent	0.27			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Explosives																			
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrobenzene, 1,3-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
HMX	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrobenzene	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 2-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 3-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Nitrotoluene, 4-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
RDX	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Tetryl	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.2	U	U	0.098	U	U	0.16	U	U	0.15	U	U	0.15	U	U	0.19	U	U
Semivolatiles																			
3-Methylphenol and 4-Methylph	mg/kg	0.21	U	U	0.49	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Acenaphthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Acenaphthylene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
ACETOPHENONE	mg/kg	-	-	-	0.12	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Atrazine	mg/kg	-	-	-	0.25	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Benzaldehyde	mg/kg	-	-	-	0.12	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(a)pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(b)fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(ghi)perylene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzo(k)fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Benzoic acid	mg/kg	1.1	U	U	-	-	-	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Benzyl alcohol	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
BIBENZENE	mg/kg	-	-	-	0.061	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-chloroethyl)ether	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Butyl benzyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Caprolactam	mg/kg	-	-	-	0.4	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloroaniline, 4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chloronaphthalene, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chlorophenol, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Chrysene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dibenz(a,h)anthracene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dibenzofuran	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,2-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,3-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzene, 1,4-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.43	U	U	0.12	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dichlorophenol, 2,4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Diethyl phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dimethyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dimethylphenol, 2,4-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Di-n-butyl phthalate	mg/kg	0.43	U	U	0.061	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.43	U	U	0.18	U	U	0.41	U	U	0.46	U	U	0.44	U	U	0.42	U	U
Dinitrophenol, 2,4-	mg/kg	1.1	U	U	0.4	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Dinitrotoluene, 2,4-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Dinitrotoluene, 2,6-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Di-n-octyl phthalate	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Fluoranthene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.0313	J	J	0.22	U	U	0.21	U	U
Fluorene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorobenzene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorobutadiene	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachlorocyclopentadiene	mg/kg	0.21	U	U	0.4	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Hexachloroethane	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Isophorone	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Methylnaphthalene, 2-	mg/kg	0.21	U	U	0.025			0.2	U	U	0.0334	J	J	0.22	U	U	0.21	U	U
Methylphenol, 2-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Naphthalene	mg/kg	0.21	U	U	0.02			0.2	U	U	0.183	J	J	0.22	U	U	0.21	U	U
Nitroaniline, 2-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitroaniline, 3-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nitroaniline, 4-	mg/kg	0.21	U	U	0.25	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrobenzene	mg/kg	0.21	U	U	0.12	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrophenol, 2-	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Nitrophenol, 4-	mg/kg	1.1	U	U	0.4	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
n-Nitrosodiphenylamine	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pentachlorophenol	mg/kg	1.1	U	U	0.18	U	U	1	U	U	1.1	U	U	1.1	U	U	1	U	U
Phenanthrene	mg/kg	0.21	U	U	0.009			0.2	U	U	0.0255	J	J	0.22	U	U	0.21	U	U
Phenol	mg/kg	0.21	U	U	0.061	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pyrene	mg/kg	0.21	U	U	0.0082	U	U	0.2	U	U	0.0309	J	J	0.22	U	U	0.21	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.21	U	U	-	-	-	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.21	U	U	0.18	U	U	0.2	U	U	0.23	U	U	0.22	U	U	0.21	U	U
Pesticides/PCBs																			
Aroclor 1016	mg/kg	0.021	U	U	0.08	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1221	mg/kg	0.021	U	U	0.062	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1232	mg/kg	0.021	U	U	0.056	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1242	mg/kg	0.021	U	U	0.049	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1248	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1254	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Aroclor 1260	mg/kg	0.021	U	U	0.068	U	U	-	-	-	0.022	U	U	0.021	U	U	-	-	-
Metals - Unfiltered																			
Aluminum	mg/kg	13100			10000			6900			5480			8830		J	8400		
Antimony	mg/kg	2.3	U	U	1.4	J	J	3.8	U	U	0.17	B	J	0.13	B	J	0.16	B	J
Arsenic	mg/kg	10.1			19			5.9			24.6			8.4		J	8.3		
Barium	mg/kg	79.8			100			53.6			46.5			55.1		J	42.5		
Beryllium	mg/kg	0.67			0.51			0.36			0.26	B	J	0.44		J	0.41		
Cadmium	mg/kg	0.38	B	J	0.51	U	U	0.76	U	U	0.8			0.57		J	0.65		
Calcium	mg/kg	2910			2600			50000			1080			19800		J	26500		
Chromium	mg/kg	20.1			18			14.5			13			13		J	12.1		
Cobalt	mg/kg	15.7			11			6.4			3.3	B	J	9.7		J	6.5		
Copper	mg/kg	26.7			30			17.6			12			19.9		J	19		
Iron	mg/kg	20700			43000			13200			31700			19100		J	15200		
Lead	mg/kg	10.6			14			12.5			7.6			11.4			12.1		
Magnesium	mg/kg	3710			3100	B		12500			748			8220		J	6880		
Manganese	mg/kg	461		J	290			249			93.6			279		J	217		
Mercury	mg/kg	0.031	B	J	0.022	J	J	0.015	B	J	0.049	B	J	0.018	B	J	0.015	B	J

Appendix F

Ash Pit 1 Coal Yard
Chemical Analytical Data Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location Code:		CY1-SB03			CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0009			CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FD			FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Nickel	mg/kg	39			36			17.5			9.8			24.7		J	19.9		
Potassium	mg/kg	1210			1000			1220			716			1280		J	1470		
Selenium	mg/kg	2.3	U	U	2	U	U	3.8	U	U	1.4	U	U	1.1	U	UJ	1	U	U
Silver	mg/kg	1.2	U	U	0.51	U	U	0.47	U	U	0.074	B	J	0.57	U	UJ	0.5	U	U
Sodium	mg/kg	1200	U	U	510	U	U	115	B	J	89.5	B	J	92.3	B	J	96.7	B	J
Thallium	mg/kg	0.58	U	U	1.5	J	J	1.9	U	U	0.64	B	J	0.38	B	J	0.5	U	U
Vanadium	mg/kg	28.9			30			14.7			22.8			17.1		J	14.3		
Zinc	mg/kg	62.9			74			50.5			27.9			44.7		J	37.5		
General Chemistry																			
% Solids	Percent	78.9			-	-	-	80.5			74			76.5			79.1		
Total organic carbon	Percent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Laboratory and data validation qualifier definitions are presented in Table 5 of Appendix H.
"-" = Not Analyzed
LQ - Laboratory qualifier. REG = Regular field Sample
mg/kg - Milligrams per kilogram. FS = Field Split
VQ - Validation qualifier. FD = Field Duplicate
The laboratory LOQ is presented for all non-detect constituents.

APPENDIX G

DETECTED HITS SUMMARY

Appendix G

Ash Pit 1 Coal Yard
Detected Hits Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location:		CY1-SB01			CY1-SB01			CY1-SB01			CY1-SB02			CY1-SB02			CY1-SB02			CY1-SB03			CY1-SB03			CY1-SB03		
Sample Number:		CY0001			CY0002			CY0003			CY0004			CY0005			CY0006			CY0007			CY0008			CY0009		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		.5 - 1.5 Ft			3 - 5 Ft			8 - 10 Ft			.3 - 1.3 Ft			3 - 5 Ft			8 - 10 Ft			.5 - 1.5 Ft			3 - 5 Ft			3 - 5 Ft		
Sample Purpose:		REG			REG			REG			REG			REG			REG			REG			REG			FD		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Semivolatiles																												
Dibenzofuran	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.103	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Fluoranthene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.138	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Fluorene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.105	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Methylnaphthalene, 2-	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.0264	J	J	U	U	U	U	U	U
Naphthalene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Phenanthrene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Pyrene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	0.124	J	J	U	U	U	U	U	U	U	U	U	U	U	U
Metals - Unfiltered																												
Aluminum	mg/kg	4660			10100			11000			2030			6020			9910			5020			11400			13100		
Antimony	mg/kg	0.12	B	J	U	U	U	U	U	U	0.14	B	J	0.23	B	J	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	mg/kg	3.1			7.9			8.4			34.6			3.8			7			9			12.5			10.1		
Barium	mg/kg	18.5			73.8			79.7			23.9			44			62.7			31.6			84.6			79.8		
Beryllium	mg/kg	0.24	B	J	0.52			0.58			0.061	B	J	0.5			0.62	B	J	0.32			0.63			0.67		
Cadmium	mg/kg	U	U	U	0.15	B	J	0.33	B	J	U	U	U	0.52			0.46	B	J	0.17	B	J	0.33	B	J	0.38	B	J
Calcium	mg/kg	727			5470			13800			447			4140			3230			2340			3110			2910		
Chromium	mg/kg	7.8			15.4			17.1			3.9			10.7			15.3			8.7			17.8			20.1		
Cobalt	mg/kg	3.1			8.3			18			0.79	B	J	9.5			14.1			3.3			14.1			15.7		
Copper	mg/kg	6			19.4			24.9			3.3			18.3			18.1			7.5			24.8			26.7		
Iron	mg/kg	8320			18800			22300			7840			17300			17100			12700			26000			20700		
Lead	mg/kg	4.8			10.7			11.8			5.5			29.8			10.3			7.2			12.8			10.6		
Magnesium	mg/kg	614			3710			6100			274			1180			2260			1090			3950			3710		
Manganese	mg/kg	30.6			316			721			23.7			188			401			148			230		J	461		J
Mercury	mg/kg	0.013	B	J	0.021	B	J	0.019	B	J	0.022	B	J	0.037	B	J	0.076	B	J	0.034	B	J	0.02	B	J	0.031	B	J
Nickel	mg/kg	7.8			23.1			36			2.3			13.6			34.1			9.4			37.2			39		
Potassium	mg/kg	212	B	J	744	B	J	1550			202	B	J	435	B	J	770	B	J	400	B	J	1390			1210		
Selenium	mg/kg	U	U	U	U	U	U	0.53	B	J	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Silver	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Sodium	mg/kg	U	U	U	U	U	U	U	U	U	111	B	J	U	U	U	U	U	U	111	B	J	U	U	U	U	U	U
Thallium	mg/kg	U	U	U	U	U	U	0.29	B	J	U	U	U	U	U	U	U	U	U	U	U	U	0.41	B	J	U	U	U
Vanadium	mg/kg	15.4			25.2			21.8			8			18.1			18.7			16.6			23.2			28.9		
Zinc	mg/kg	21.3			43.9			57.6			9.4			157			163			21.1			57			62.9		
Water Quality Parameters																												
% Solids	Percent	83.3			78.7			76.9			83.1			79.7			79.8			82.9			78.2			78.9		

Appendix G

Ash Pit 1 Coal Yard
Detected Hits Summary
Former Plum Brook Ordnance Works
Sandusky, Ohio

Location:		CY1-SB03			CY1-SB03			CY1-SB04			CY1-SB04			CY1-SB04		
Sample Number:		CY0010			CY0011			CY0012			CY0013			CY0014		
Sample Date:		20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11			20-Dec-11		
Sample Depth:		3 - 5 Ft			8 - 10 Ft			1 - 2 Ft			3 - 5 Ft			8 - 10 Ft		
Sample Purpose:		FS			REG			REG			REG			REG		
Parameter	Units	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ	Result	LQ	VQ
Semivolatiles																
Dibenzofuran	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Fluoranthene	mg/kg	U	U	U	U	U	U	0.0313	J	J	U	U	U	U	U	U
Fluorene	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Methylnaphthalene, 2-	mg/kg	0.025			U	U	U	0.0334	J	J	U	U	U	U	U	U
Naphthalene	mg/kg	0.02			U	U	U	0.183	J	J	U	U	U	U	U	U
Phenanthrene	mg/kg	0.009			U	U	U	0.0255	J	J	U	U	U	U	U	U
Pyrene	mg/kg	U	U	U	U	U	U	0.0309	J	J	U	U	U	U	U	U
Metals - Unfiltered																
Aluminum	mg/kg	10000			6900			5480			8830		J	8400		
Antimony	mg/kg	1.4	J	J	U	U	U	0.17	B	J	0.13	B	J	0.16	B	J
Arsenic	mg/kg	19			5.9			24.6			8.4		J	8.3		
Barium	mg/kg	100			53.6			46.5			55.1		J	42.5		
Beryllium	mg/kg	0.51			0.36			0.26	B	J	0.44		J	0.41		
Cadmium	mg/kg	U	U	U	U	U	U	0.8			0.57		J	0.65		
Calcium	mg/kg	2600			50000			1080			19800		J	26500		
Chromium	mg/kg	18			14.5			13			13		J	12.1		
Cobalt	mg/kg	11			6.4			3.3	B	J	9.7		J	6.5		
Copper	mg/kg	30			17.6			12			19.9		J	19		
Iron	mg/kg	43000			13200			31700			19100		J	15200		
Lead	mg/kg	14			12.5			7.6			11.4			12.1		
Magnesium	mg/kg	3100	B		12500			748			8220		J	6880		
Manganese	mg/kg	290			249			93.6			279		J	217		
Mercury	mg/kg	0.022	J	J	0.015	B	J	0.049	B	J	0.018	B	J	0.015	B	J
Nickel	mg/kg	36			17.5			9.8			24.7		J	19.9		
Potassium	mg/kg	1000			1220			716			1280		J	1470		
Selenium	mg/kg	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Silver	mg/kg	U	U	U	U	U	U	0.074	B	J	U	U	U	U	U	U
Sodium	mg/kg	U	U	U	115	B	J	89.5	B	J	92.3	B	J	96.7	B	J
Thallium	mg/kg	1.5	J	J	U	U	U	0.64	B	J	0.38	B	J	U	U	U
Vanadium	mg/kg	30			14.7			22.8			17.1		J	14.3		
Zinc	mg/kg	74			50.5			27.9			44.7		J	37.5		
Water Quality Parameters																
% Solids	Percent	-	-	-	80.5			74			76.5			79.1		

Laboratory and data validation qualifier definitions are presented in Table 5 of Appendix H.

"-" = Not Analyzed
"U" = Not Detected
LQ - Laboratory qualifier.
REG = Regular field Sample
mg/kg - Milligrams per kilogram.
FS = Field Split
VQ - Validation qualifier.
FD = Field Duplicate
The laboratory LOQ is presented for all non-detect constituents.

APPENDIX H

DATA QUALITY EVALUATIONS

DATA QUALITY EVALUATION

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List of Acronyms

CCAL	continuing calibration
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
ICAL	initial calibration
ICP	inductively coupled plasma
ICS	interference check sample
LCS	laboratory control sample
MDL	method detection limit
MQL	method quantitation limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
PBOW	Plum Brook Ordnance Works
PQL	practical quanitation limit
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
Shaw	Shaw Environmental, Inc.
RPD	relative percent difference

1.0 Introduction

This appendix presents results of the quality assurance (QA)/quality control (QC) measures implemented for the sampling and analysis activities at Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The quality indicators from every aspect of the data collection were reviewed, and an assessment of the data with regard to project-specific objectives is presented. Successful execution of project-specific objectives and procedures provides strong support for the acceptance of the data generated as adequate for the purpose of evaluating the analytical results from this assessment at PBOW.

Shaw Environmental, Inc. (Shaw) conducted investigative work at the Coal Yard 1 area; sampling was performed in December 2011. Primary and field duplicate project samples were analyzed by Accutest Laboratories, of Orlando, Florida. Field split samples were submitted to Test America Laboratories, Inc. of North Canton, Ohio, for analysis. All data analyzed were reviewed for accuracy and completeness. One hundred percent of the data analyzed were subjected to data validation following the guidelines in the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) the QA project plan, and EPA Region 3 Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (April 1993). Since these documents specify procedures for Contract Laboratory Program data, they are used as guidelines only. Method and laboratory QA and QC requirements supersede these guidelines, where applicable. Data were evaluated against specific criteria to verify the achievement of precision, accuracy, representativeness, completeness and comparability goals established to meet the project data quality objectives (DQO). To verify that these DQOs were met, field measurements, sampling and handling procedures, laboratory analysis and reporting, and all nonconformances and discrepancies in the data were examined to determine compliance with the appropriate and applicable procedures defined in the sampling and analysis plan (SAP). The results of this review are presented in the following sections, with all analytical outliers or nonconformances discussed where they occurred.

This report is divided into three sections. Section 2.0 discusses the field investigation and QC procedures used during the sampling effort. Section 3.0 outlines the analytical program and the associated QC activities performed. The final part of this document, Section 4.0, summarizes the data findings and their overall impact on the usability of the analytical data.

2.0 Field Sampling and Quality Control Activities

Shaw was retained by the U. S. Army Corps of Engineers Nashville District to conduct investigative and sampling activities at PBOW. Field activities at this site included collection of soil samples. The collection of these samples and their associated QC samples are discussed in this section of the data quality evaluation. Thirteen project samples and one field duplicate soil sample were submitted to Accutest for analysis. Sample shipments from the field were performed under custody and documented using standard Shaw analysis request/chain-of-custody forms. These forms provided project-specific analytical specifications and QC instructions to the laboratory. A formal chain-of-custody transfer record was prepared and included with these forms to document custody during sample transportation, storage, and disposition by the laboratory. Table 1 summarizes the field sample number, location, sample type, date of collection, lot number, and laboratory for each sample collected.

2.1 Equipment Rinsates

Equipment rinsates are used to assess the effectiveness of the decontamination procedures used by the sampling team on reusable sampling equipment. No equipment rinsate samples were collected during this sampling event.

2.2 Field Duplicates

Field duplicate samples are collected and submitted to the laboratory for analysis along with their corresponding original sample. The data generated from the analysis of field duplicate samples are used to evaluate the precision of the sample collection and analysis procedures. It is difficult to collect and analyze soil samples in duplicate due to the heterogeneous nature of soil. High relative percent difference (RPD) between an original sample and its field duplicate may indicate a difference in sample matrix or sample collection rather than true problems with precision of sample analysis. Also, when estimated (“J”) or nondetected (“U”) results are reported, there is a potential for increased variability between the primary and duplicate sample results.

Field duplicate samples were collected at a frequency of 1 for every 10 samples (10 percent). One field duplicate soil sample was collected during this sampling event. Table 2 compares the original and field duplicate results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field duplicate samples. Sample sets with no detections are not presented in the table. In cases where duplicates were performed and one result is less than the reporting limit but greater than the method

detection limit, the RPD is reported but is of limited value. Only samples with detections in both the regular and the duplicate were qualified for high RPDs.

The acceptance criterion of 30 percent RPD for waters and 50 percent RPD for soils was used to evaluate these sample results. The RPD value for manganese in sample/duplicate pair CY0008/CY0009 exceeded the acceptance criteria resulting in the qualification of data. Overall, the data compared well when detected concentrations were greater than the reporting limit. RPD is calculated by using the following formula:

$$RPD = \left| \frac{A - B}{(A + B)/2} \right| \quad x \quad 100$$

where:

RPD	=	relative percent difference
A	=	original result
B	=	field duplicate result.

2.3 Field Split Samples

Split samples were collected in conjunction with field duplicate samples and sent to Test America Laboratories, Inc. of North Canton. The split samples were submitted to the laboratory for the same analyses as their corresponding field duplicates and original field samples. The split samples are used to determine if data results are reproducible when analyzed by two different laboratories. Results are also evaluated to determine if a contracted laboratory's preparation and analysis procedures are in control and meet the approved method criteria.

Field split samples were collected at a frequency of approximately 1 for every 10 regular samples. One soil field split sample was collected during this sampling event. Table 2 compares the original and field split results and shows the RPDs calculated for those detected compounds. Compounds not presented in the table were not detected in either the original or field split samples. Samples with no detections are not presented in the table. Field split samples were not qualified for RPD criterion.

3.0 Analytical Program and Quality Control Activities

The project QA/QC program described in the SAP was followed for the collection and laboratory analysis of samples. Each of the analytical methods used require that method-specific QA/QC

protocols be followed during sample analysis. These protocols are a critical part of the methods employed and were followed by the laboratory during sample analysis. Specific measures included detailed record-keeping procedures, instrument calibrations, and analysis of method blanks, blank spikes, matrix spike (MS)/matrix spike duplicate (MSD), surrogates, and internal standards. The following SW-846 and EPA methods were used to analyze PBOW samples:

Analysis	Method
Semivolatiles	SW-846 3550C/8270D
Nitroaromatics	SW-846 8330A
Metals	SW-846 3050B/6010C/7471B
Polychlorinated Biphenyls	SW-846 3550C/8082A
Wet Chemistry	Total Organic Carbon by Walkley Black

The validator used the QA/QC criteria defined in the SAP, laboratory-derived acceptance criteria, and analytical method criteria to qualify data. Any qualifiers added to these data by the data validator are included in the data summary report.

3.1 Laboratory Quality Assurance/Quality Control Procedures

The following sections discuss specific QA/QC protocols required and performed by the laboratory during this investigation.

3.1.1 Calibration

The calibration of instruments is required to ensure that the instruments are operating properly. Calibration is achieved when instrument response can be related to the concentration of an analyte. All analytes met QC criteria for initial calibration (ICAL) percent relative standard deviation and/or continuing calibration (CCAL) percent difference. The following criteria are used to evaluate the data: individual ICAL percent relative standard deviation +/- 30 percent and/or CCAL percent difference +/- 20 percent (volatile and semivolatile organics); +/-15 percent (explosives); for metals, individual ICAL/CCAL percent relative standard deviation +/- 10 percent; and for mercury, individual ICAL/CCAL percent relative standard deviation +/- 20 percent. No sample qualification was required.

3.1.2 Method/Calibration Blanks

Method blanks are analyzed with each analytical "batch" processed on a per matrix (i.e., soil and water) basis. Method blanks are carried step-wise through the same analytical procedure as their associated field samples including the addition of solvents, surrogate and standard spikes, and reagents as required in the analysis process. The purpose of a method blank is to identify any

contaminants that may be introduced to the sample as a result of the analytical process. The method blank is considered acceptable by the laboratory if the concentration of any target analyte is less than ½ the reporting limit and less than 1/10 the amount measure in any sample or regulatory limit (whichever is greater). The data validator evaluated all blank data associated with each sample. The data validators evaluated all blank data associated with each sample. The third party data validation evaluation criteria for method blanks are as follows:

- If a parameter is found in a blank but not detected in the sample, no action is taken.
- For organics, if the sample result is less than 5 times (most analytes) or 10 times (common laboratory contaminants) that of the blank result, the sample result is qualified “B.”
- For inorganics, if the sample result is greater than the instrument detection limit but less than 5 times the blank result, the sample result is qualified "B."

If the sample result is greater than 5 times (most analytes) or 10 times (common laboratory contaminants) the blank result, no action is taken. All method blanks were found to be acceptable.

3.1.3 Surrogate Recoveries

Surrogate standards are defined as non-target compounds added to standards, blanks, and samples prior to extraction or purging. They are used in organic analyses to monitor the percent recovery efficiencies of the sample preparation and analytical procedures. Surrogate recoveries for the project samples all fell within acceptable QC criteria.

The surrogate control limits for this project can be found in Attachment A of Appendix E. The surrogate control limits used for evaluation are the laboratory established in-house surrogate criteria.

3.1.4 Matrix Spikes and Laboratory Control Spikes

Two types of spikes were performed for all analyses: MSs and laboratory control samples (LCS). MS compounds are spiked into an aliquot of a field sample. LCS compounds are spiked into a blank matrix. The spiked compounds are representative compounds that are quantified during performance of the method. Recovery of the spiked compound is used as an assessment of analytical accuracy for the sample matrix analyzed. These results are useful in distinguishing sample matrix interferences from analysis interferences through a comparison of MS and LCS recovery data. Often, spikes are performed in duplicate as an MSD or LCS duplicate. In this

manner, the precision of the assessment can be quantified as the RPD of the original and duplicate spike.

MSs were assigned at a frequency of at least 1 for every 20 field samples collected. One MS/MSD pair, CY0013-MS/MSD, was assigned to samples. Additional sample volume was provided to the laboratory for the MS/MSD analyses. This sampling frequency meets the collection criteria for this program as specified in the SAP. In addition to the overall collection frequency, the analytical method requires that the laboratory analyze one set of spikes per analytical batch. To comply with this method requirement, the laboratory may analyze additional MS/MSD pairs. The validator evaluated all batch QC. The laboratory's statistically determined target acceptance limits were used to assess the spike recovery and RPD.

The following MS/MSD recoveries are outside of established QC criteria:

Sample Delivery Group	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Nickel, Potassium, Selenium, Silver, Sodium, Vanadium, Zinc	J/UJ

LCS results are used to evaluate laboratory method performance in the same manner as the MS/MSD results, except the LCS is not performed on an actual field sample matrix. The LCS is prepared for each analytical batch and for each parameter and matrix analyzed. All LCS recoveries met QC criteria.

The LCS and MS/MSD control limits for this project can be found in Attachment A of Appendix E. The LCS and MS/MSD control used for evaluation are the laboratory established in-house control limits. Detected constituents with associated MS/MSD recoveries above or below the QC limits were qualified as estimated “J”. Sample results with associated MS/MSD or LCS recoveries below the QC limits were qualified as estimated non-detects “UJ”.

3.1.5 Laboratory Duplicate Sample Analysis

Laboratory duplicate determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate sample analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. Laboratory duplicates are not required for nitoraromatic analysis. All laboratory duplicate sample analysis met QC criteria with the following exception:

Sample Delivery Group	Samples Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Barium	J

3.1.6 Column Agreement

For high-performance liquid chromatography analyses, sample results are confirmed using two dissimilar columns. In order for an analyte to be reported, it must be detected on both columns. Results differing by greater than 40 percent are qualified estimated (J); however, for this sampling event, all detections were in agreement.

3.1.7 Interference Check Sample and Post Digestion Spike

The ICP Interference Check Sample (ICS) verifies the contract laboratory's interelement and background correction factors. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and solution AB consists of the analytes mixed with the interferents. An ICS analysis consists of analyzing both solutions consecutively, starting with solution A, for all wavelengths used for each analyte reported by ICP. Results for the ICP analysis of the ICS solution AB must fall within the control limits of $\pm$ 20% of the true value for the analytes included in the solution. All Interference Check Sample (ICS) percent recoveries were acceptable.

Post Digestion spikes are elements added to a portion of a prepared sample to verify the absence or presence of matrix effects for ICP and ICP/MS analysis. To verify the absence of interference, the spike recovery must be between 75% and 125%. Results outside the acceptance limits require a method of standard additions (MSA) for all samples within the batch. All post digestion spike recoveries were found to be acceptable.

3.1.8 Inductively Coupled Plasma Serial Dilutions

The ICP serial dilution analysis is performed to determine whether or not significant physical or chemical interferences exist due to sample matrix. All QC criteria were met for the serial dilutions associated with the project samples, with the following exceptions:

Sample Delivery Group	Sample(s) Affected	Analyte(s)	Validation Qualifier
F88938	CY0013	Aluminum, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Vanadium, Zinc	J

3.2 Reporting Limits

Limits have been established to describe project sensitivity requirements. Each laboratory is required to demonstrate method performance through method detection limit (MDL) studies for every method employed. These studies are required to be laboratory-specific so that individual laboratory variables such as equipment brands, reagent suppliers, and chemist technique are factored into the performance study. MDLs are established using controlled matrices (i.e., deionized water). Practical quantitation limits (PQL) or method quantitation limits (MQL) used for this project are those statistically determined by the laboratories. The analytical program executed for this project required the use of SW-846 methods, which specify the procedure for calculating the MDLs. The PQL/MQL calculation adjusts the limit by a predetermined mathematical factor for the analysis of actual environmental sample matrices (i.e., soil, groundwater, etc.). Method reporting limits (MRL) are based on the project action or decision levels.

These limits are generally defined as follows:

- ***MDL.*** The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the concentration is greater than zero.
- ***MQL/PQL.*** The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. It is set at the lowest standard used for the calibration curve.
- ***MRL.*** A threshold value below which the laboratory reports a result as nondetected. Ideally, the MRL will be established anywhere between the MDL and 1/2 the project action levels.

An MDL is the lower limit at which the laboratory can differentiate a measurement from background. The MDL is determined in accordance with the procedures in 40 Code of Federal Regulations Part 136. If project action levels are near or below the MDL, it is unlikely the sensitivity of the method will be achievable. A compromise must be reached. The PQL/MQL is the lower limit at which a measurement becomes meaningful. This measurement (the PQL or the reporting limit) is generally a multiple of three to five times the MDL.
Most samples were handled and analyzed as expected without significant changes to the anticipated project MQLs.

3.3 Holding Times/Preservation

All laboratory results submitted for this investigation have been reviewed with respect to laboratory adherence to extraction and analysis holding times. All hold times and preservation requirements were met. No qualification was required.

4.0 Data Evaluation and Usability

The analytical data review process identified a few analytical nonconformance issues that were noted during this analytical program. These anomalies have been discussed in the previous sections of this appendix. Table 3 summarizes all compounds requiring qualifier application due to anomalies discovered during data validation. Table 4 defines the reason codes for qualification, and Table 5 defines the data validation qualifiers.

The following definitions are used for defining precision, accuracy, representativeness, completeness, and comparability as they have been applied to this evaluation.

Precision. Precision is a measurement of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision data were obtained through the analysis and evaluation of duplicate QA samples. Accuracy was determined through the analysis and evaluation of method blanks, LCSs, trip blanks, equipment rinsates, and MS samples.

Accuracy. Accuracy is a measurement of bias in a system and is expressed as a percent recovery. These QA samples were collected and/or analyzed at the frequency established in the SAP, verifying the completeness element of the DQOs along with the evaluation of holding times and reporting limits. Percent recovery is calculated as follows:

$$Percent\ Recovery = \left(\frac{(x - s)}{T} \right) * 100$$

Where:

X = the laboratory determined concentration of a spiked sample
S = the sample native concentration prior to spike
T = the true concentration of the spike.

RPD is calculated as follows:

$$Relative\ Percent\ Difference = \left[\frac{|D1 - D2|}{\frac{D1 + D2}{2}} \right] * 100$$

Where:

D1 and D2 = the results of duplicate measurements.

Representativeness. Representativeness is a qualitative parameter that expresses the degree to which sample data actually represent the matrix and site conditions. For example, in conducting groundwater monitoring, representativeness requires proper location of wells and the collection of samples under consistent, documented procedures. Wells are located based upon the results of the hydrological study in progress and are designed to provide maximum coverage of the flow conditions. Requirements and procedures for sample collection and handling are designed to maximize sample representativeness. Representativeness also can be monitored by reviewing field documentation and by performing field audits.

The samples were collected using Shaw standard operating procedures (SOP) and were fully documented through the use of standard Shaw field forms. Samples are representative of the matrix and site sampled.

Completeness. Completeness is a measure of the amount of valid data that are obtained during a sampling event as compared to the amount of data planned to be collected under optimum conditions. Some data for this project were qualified as estimated in the validation process because of the outliers noted in the MS recoveries, duplicate results for certain elements, and various other calibration and column confirmation percent difference results. Completeness is calculated as follows:

$$Completeness\ \% = \left(\frac{D_r}{D_c} \right) X\ 100$$

Where:

D_r = the number of data points for which valid results are reported
D_c = the number of valid samples/data points that are collected and reach the laboratory for analysis.

During this task, 13 regular project samples, 1 field duplicate, and 1 field split sample were collected, resulting in approximately 1,525 targeted analytical records. No results were rejected. Using the above calculation, 100 percent completeness was achieved for the task.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability ensures that results for the sampling event can be compared with data from other past and/or future sampling programs. Comparability for this sampling event was achieved through the use of established and recognized techniques and accepted standard EPA methods. All samples collected and analyzed were subjected to the same sampling, handling, preparation, analysis, reporting, and validation criteria for the purpose of achieving comparability goals within the data set.

Statement of Data Usability. The overall results of the analyses, as discussed in this evaluation, suggest that representative samples were collected and analyzed, and the results are indicative of the media analyzed, with the exception of the few anomalies noted. The data do reflect expected site conditions and are usable for their intended purpose.

Tables 1, 2, 3, 4 and 5 summarize the analytical program and the results for the data validation effort for all samples collected by Shaw at PBOW Coal Yard 1 area.

TABLES

Table 1

Sample Cross Reference
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Type	Sample Location	Sample Number	Sample Date	Sample Purpose	SDG Number	Laboratory
SS	CY1-SB01	CY0001	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB01	CY0002	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB01	CY0003	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB02	CY0004	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB02	CY0005	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB02	CY0006	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB03	CY0007	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB03	CY0008	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB03	CY0009	20-Dec-11	FD	F88938	Accutest
DS	CY1-SB03	CY0010	20-Dec-11	FS	240-7168-1	Test America
DS	CY1-SB03	CY0011	20-Dec-11	REG	F88938	Accutest
SS	CY1-SB04	CY0012	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB04	CY0013	20-Dec-11	REG	F88938	Accutest
DS	CY1-SB04	CY0014	20-Dec-11	REG	F88938	Accutest

SDG - Sample delivery group.

Table 2

Summary of Original, Field Duplicate, and Field Split Hits with Relative Percent Difference Calculations
Former Plum Brook Ordnance Works
Sandusky, Ohio

		Location:	CY1-SB03		CY1-SB03		CY1-SB03		Relative	Relative
		Sample Number:	CY0008		CY0009		CY0010		Percent	Percent
		Sample Date:	20-Dec-11		20-Dec-11		20-Dec-11		Difference	Difference
		Sample Depth:	3 - 5 Ft		3 - 5 Ft		3 - 5 Ft		REG and FD	REG and FS
		Sample Purpose:	REG		FD		FS			
Parameter	Filtered	Units	Result	ValQual	Result	ValQual	Result	ValQual		
Aluminum	N	mg/kg	11400		13100		10000		13.88	13.08
Antimony	N	mg/kg	1.9	U	1.9	U	1.4	J	-	-
Arsenic	N	mg/kg	12.5		10.1		19		21.24	159.71
Barium	N	mg/kg	84.6		79.8		100		5.84	16.68
Beryllium	N	mg/kg	0.63		0.67		0.51		6.15	21.05
Cadmium	N	mg/kg	0.33	J	0.38	J	0.3	U	14.08	-
Calcium	N	mg/kg	3110		2910		2600		6.64	-
Chromium	N	mg/kg	17.8		20.1		18		12.14	1.12
Cobalt	N	mg/kg	14.1		15.7		11		10.74	24.70
Copper	N	mg/kg	24.8		26.7		30		7.38	18.98
Iron	N	mg/kg	26000		20700		43000		22.70	49.28
Lead	N	mg/kg	12.8		10.6		14		18.80	8.96
Magnesium	N	mg/kg	3950		3710		3100		6.27	24.11
Manganese	N	mg/kg	230	J	461	J	290		**66.86**	23.08
Mercury	N	mg/kg	0.02	J	0.031	J	0.022	J	43.14	9.52
Nickel	N	mg/kg	37.2		39		36		4.72	3.28
Potassium	N	mg/kg	1390		1210		1000		13.85	32.64
Thallium	N	mg/kg	0.41	J	0.058	U	1.5	J	-	114.14
Vanadium	N	mg/kg	23.2		28.9		30		21.88	25.56
Zinc	N	mg/kg	57		62.9		74		9.84	25.95

FD - Field duplicate.
FS - Field split.
mg/kg - Milligrams per kilogram.
REG - Regular field sample.
"-" = Not Calculated

Table 3

Summary of Data Validation Reason Codes
Former Plum Brook Ordnance Works
Sandusky, Ohio

Reason Code	Description
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding Time Exceeded
02A	Extraction
02B	Analysis
03	Instrument Performance - Outside Criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	retention time windows
03E	Resolution
04	Initial Calibration results outside specified criteria
04A	Compound mean RRF<0.05
04B	Compound %RSD>30
04C	Correlation Coefficient<0.995
05	Continuing Calibration results outside specified criteria
05A	Compound mean RRF<0.05
05B	Compound %D>25
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or Preparation Blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate Recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	%RPD outside acceptance criteria (precision)
09	Post Digestion Spike outside criteria (GFAA)
10	Internal Standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory Control Sample recoveries outside specified control limits
11A	Recovery
11B	%RPD (if run in duplicate)
12	Interference Check Standard
13	Serial Dilution
14	Tentatively Identified Compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria exceeded
18	Percent difference between original and second column > 25%
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings
999	See hard copy for details.

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Former Plum Brook Ordnance Works
Sandusky, Ohio

Work Order	Sample Number	Analysis	Parameter	Reason Codes				
				VQ	R1	R2	R3	R4
F88938	CY0001	METALS3	Potassium	J	15			
F88938	CY0001	METALS3	Antimony	J	15			
F88938	CY0001	METALS3	Beryllium	J	15			
F88938	CY0001	METALS3	Mercury	J	15			
F88938	CY0002	METALS3	Potassium	J	15			
F88938	CY0002	METALS3	Cadmium	J	15			
F88938	CY0002	METALS3	Mercury	J	15			
F88938	CY0003	METALS3	Thallium	J	15			
F88938	CY0003	METALS3	Cadmium	J	15			
F88938	CY0003	METALS3	Selenium	J	15			
F88938	CY0003	METALS3	Mercury	J	15			
F88938	CY0004	METALS3	Potassium	J	15			
F88938	CY0004	METALS3	Sodium	J	15			
F88938	CY0004	METALS3	Antimony	J	15			
F88938	CY0004	METALS3	Beryllium	J	15			
F88938	CY0004	METALS3	Cobalt	J	15			
F88938	CY0004	METALS3	Mercury	J	15			
F88938	CY0005	METALS3	Potassium	J	15			
F88938	CY0005	METALS3	Antimony	J	15			
F88938	CY0005	METALS3	Mercury	J	15			
F88938	CY0005	SEMIVOLATILES3	Pyrene	J	15			
F88938	CY0005	SEMIVOLATILES3	Dibenzofuran	J	15			
F88938	CY0005	SEMIVOLATILES3	Fluoranthene	J	15			
F88938	CY0005	SEMIVOLATILES3	Fluorene	J	15			
F88938	CY0006	METALS3	Potassium	J	15			
F88938	CY0006	METALS3	Beryllium	J	15			
F88938	CY0006	METALS3	Cadmium	J	15			
F88938	CY0006	METALS3	Mercury	J	15			
F88938	CY0007	METALS3	Potassium	J	15			
F88938	CY0007	METALS3	Sodium	J	15			
F88938	CY0007	METALS3	Cadmium	J	15			
F88938	CY0007	METALS3	Mercury	J	15			
F88938	CY0007	SEMIVOLATILES3	Methylnaphthalene, 2-	J	15			
F88938	CY0008	METALS3	Manganese	J	17			
F88938	CY0008	METALS3	Thallium	J	15			
F88938	CY0008	METALS3	Cadmium	J	15			
F88938	CY0008	METALS3	Mercury	J	15			
F88938	CY0009	METALS3	Manganese	J	17			
F88938	CY0009	METALS3	Cadmium	J	15			
F88938	CY0009	METALS3	Mercury	J	15			
240-7168-1	CY0010	METALS3	Thallium	J	15			
240-7168-1	CY0010	METALS3	Antimony	J	15			
240-7168-1	CY0010	METALS3	Mercury	J	15			
F88938	CY0011	METALS3	Sodium	J	15			
F88938	CY0011	METALS3	Mercury	J	15			
F88938	CY0012	METALS3	Silver	J	15			
F88938	CY0012	METALS3	Sodium	J	15			
F88938	CY0012	METALS3	Thallium	J	15			
F88938	CY0012	METALS3	Antimony	J	15			
F88938	CY0012	METALS3	Beryllium	J	15			

Table 4

Summary of Data Validation Qualifiers Assigned and Reason Codes for Qualification
Former Plum Brook Ordnance Works
Sandusky, Ohio

Work	Sample			Reason Codes				
F88938	CY0012	METALS3	Cobalt	J	15			
F88938	CY0012	METALS3	Mercury	J	15			
F88938	CY0012	SEMIVOLATILES3	Pyrene	J	15			
F88938	CY0012	SEMIVOLATILES3	Fluoranthene	J	15			
F88938	CY0012	SEMIVOLATILES3	Phenanthrene	J	15			
F88938	CY0012	SEMIVOLATILES3	Naphthalene	J	15			
F88938	CY0012	SEMIVOLATILES3	Methylnaphthalene, 2-	J	15			
F88938	CY0013	METALS3	Aluminum	J	13			
F88938	CY0013	METALS3	Iron	J	13			
F88938	CY0013	METALS3	Magnesium	J	13			
F88938	CY0013	METALS3	Manganese	J	13			
F88938	CY0013	METALS3	Nickel	J	08A	13		
F88938	CY0013	METALS3	Potassium	J	08A	13		
F88938	CY0013	METALS3	Silver	UJ	08A			
F88938	CY0013	METALS3	Sodium	J	08A		15	
F88938	CY0013	METALS3	Thallium	J	15			
F88938	CY0013	METALS3	Antimony	J	08A	15		
F88938	CY0013	METALS3	Arsenic	J	08A	13		
F88938	CY0013	METALS3	Barium	J	08A	08B	13	
F88938	CY0013	METALS3	Beryllium	J	08A	13		
F88938	CY0013	METALS3	Cadmium	J	08A	13		
F88938	CY0013	METALS3	Chromium	J	08A	13		
F88938	CY0013	METALS3	Cobalt	J	08A	13		
F88938	CY0013	METALS3	Copper	J	08A	13		
F88938	CY0013	METALS3	Vanadium	J	08A	13		
F88938	CY0013	METALS3	Zinc	J	08A	13		
F88938	CY0013	METALS3	Calcium	J	13			
F88938	CY0013	METALS3	Selenium	UJ	08A			
F88938	CY0013	METALS3	Mercury	J	15			
F88938	CY0014	METALS3	Sodium	J	15			
F88938	CY0014	METALS3	Antimony	J	15			
F88938	CY0014	METALS3	Mercury	J	15			

Table 5

Laboratory and Validation Qualifier Definitions
Former Plum Brook Ordnance Works
Sandusky, Ohio

Qualifier	Definition
Laboratory	
B	Indicates the analyte is found in associated method blank.
J	Indicates the analyte result is an estimated value.
ND	Not detected. The compound was analyzed for, but not detected above the associated reporting limit.
MDL	Method detection limit.
RL	Reporting limit.
E	Indicates the value exceeds the calibration range.
ND	Indicates presumptive evidence of a compound
Validation	
B	The compound/analyte was detected in a lab or field blank.
J	The compound/analyte was positively identified; the reported value is an estimated concentration.
U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
UJ	The analyte is not detected; the result is an estimated value.
R	Analyte is rejected.

APPENDIX I

CHAINS OF CUSTODY

F88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 122 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884
Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
1	CY0001	SOIL	12-20-11 / 1100	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082, TOC by Walkley-Black		
2	CY0002	SOIL	12-20-11 / 1115	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
3	CY0004	SOIL	12-20-11 / 1000	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
4	CY0005	SOIL	12-20-11 / 1015	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
5	CY0007	SOIL	12-20-11 / 1155	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
6	CY0008	SOIL	12-20-11 / 1205	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
7	CY0009	SOIL	12-20-11 / 1205	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
8	CY0012	SOIL	12-20-11 / 1242	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
9	CY0013	SOIL	12-20-11 / 1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver — Date: 12-21-11 Time: 1600
2. Relinquished by: FX — Date: 12/22/11 Time: 7:30
3. Relinquished by: — Date: Time:

1. Received by: FX — Date: Time:
2. Received by: [signature] ALSE — Date: 12/22/11 Time: 7:30
2. Received by: — Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB[illegible]1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
9 CY0013 MS	SOIL	12-20-11/1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
9 CY0013 MSD	SOIL	12-20-11/1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
	SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: Fred Jones ALSE Date: 12 22 11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
10	CY0003	SOIL	12-20-11/1145	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
11	CY0006	SOIL	12-20-11/1042	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
12	CY0011	SOIL	12-20-11/1225	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
13	CY0014	SOIL	12-20-11/1340	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X
Project Specific: ____

1. Relinquished by: Eric W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: Zl Jones ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PBOW 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
14	CY0035	SOIL	12-19-11 / 1140	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
15	CY0038	SOIL	12-19-11 / 1330	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
16	CY0041	SOIL	12-19-11 / 1555	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
17	CY0044	SOIL	12-19-11 / 1630	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471		

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X
Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: [illegible] ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB[illegible]/1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
18	CY0042	SOIL	12-19-11/1600	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
19	CY0043	SOIL	12-19-11/1610	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
		SOIL		2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

EW

Special Instructions:

Possible Hazard Identification:
Non-haz: ___ Flammable: ___ Poison B: ___ Unknown: X

Sample Disposal:
Return to Client: ___ Disposal by Lab: X Archive: ___

Turnaround Time:
Normal: X Rush: ___

Level of QC Required:
Definitive: X Project Specific: ___

1. Relinquished by: E. W. Weaver Date: 12-21-11 Time: 1600
2. Relinquished by: Date: Time:
3. Relinquished by: Date: Time:

1. Received by: FX Date: Time:
2. Received by: T. L. Torres ALSE Date: 12/22/11 Time: 730
2. Received by: Date: Time:

Comments:

3.4c

F 88938

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB 1221 11ACCT

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mike Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Accutest
Laboratory Contact: Sue Bell
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8768-6974-9869

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

	Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
20	CY0031	SOIL	12-19-11 / 1105	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082, TOC by Walkley-Black		
21	CY0032	SOIL	12-19-11 / 1119	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
22	CY0033	SOIL	12-19-11 / 1119	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
23	CY0036	SOIL	12-19-11 / 1250	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
24	CY0037	SOIL	12-19-11 / 1310	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
25	CY0039	SOIL	12-19-11 / 1540	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040MS	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
26	CY0040MSD	SOIL	12-19-11 / 1545	2-Wide Mouth Glass Jar	8 oz	Cool	Explosives by 8330, SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X
Project Specific: ____

1. Relinquished by: Eddie W. Weaver — Date: 12-21-11 Time: 1600
2. Relinquished by: — Date: Time:
3. Relinquished by: — Date: Time:

1. Received by: FX — Date: Time:
2. Received by: [signature] — Date: 12/22/11 Time: 930
2. Received by: — Date: Time:

Comments:

3.4c

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: F 88938 CLIENT: Shaw PROJECT: PBOW

DATE/TIME RECEIVED: 12/22/11 730 {MM/DD/YY 24:00} NIMBER OF COOLERS RECEIVED: 1

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8768 6974 9869

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 25-GRAM_____ 5-GRAM_____

NUMBER OF 5035 FIELD KITS ? _____

NUMBER OF LAB FILTERED METALS ? _____

TEMPERATURE INFORMATION

- [ ] IR THERM ID 1 CORR. FACTOR +0.2
- [ ] OBSERVED TEMPS: 3.2
- [ ] CORRECTED TEMPS: 3.4

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

{APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS}

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE [signature] 12/22/11 REVIEWER SIGNATURE/DATE [signature] 12-22-11

NF 12/10

Shaw
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: PB EW 1221 11TA

PAGE 1 OF 1

Project Name/No: PBOW
Sample Team Member: Mke Gunderson
Profit Center: Knoxville
Project Manager: Steve Downey
Project No.: 132457 Coal Yards
Required Report Date: 21 DAYS

Sample Shipment Date: 12-21-11
Laboratory Destination: Test America
Laboratory Contact: Denise Pohl
Project Contact/Phone: Eddie Weaver/865-690-3211
Carrier Waybill No.: 8989-5317-7768

Bill To: Attn: Accounts Payable Dept.
Shaw Environmental
P.O. Box 98519
Baton Rouge, LA 70884

Report To: Eddie Weaver
Shaw E & I
312 Directors Drive
Knoxville, TN 37923

Sample Number	Sample Type/ Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
CY0034	Soil	12-19-11 / 1119	Wide Mouth Glass Jar	1 8 ~~2~~ X ~~4~~ oz EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~8~~ oz	Cool	Explosives by 8330A		
CY0010	Soil	12-20-11 / 1205	Wide Mouth Glass Jar	1 8 ~~2~~ X ~~4~~ oz EW	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				~~8~~ oz	Cool	Explosives by 8330A		
	Soil		Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		
	Soil		Wide Mouth Glass Jar	2 X 4 oz	Cool	SVOC by 8270, TAL Metals by 6010/7471, PCBs by 8082		
				4 oz	Cool	Explosives by 8330A		

EW

Special Instructions:

Possible Hazard Identification:
Non-haz: ____ Flammable: ____ Poison B: ____ Unknown: X

Sample Disposal:
Return to Client: ____ Disposal by Lab: X Archive: ____

Turnaround Time:
Normal: X Rush: ____

Level of QC Required:
Definitive: X Project Specific: ____

1. Relinquished by: E. W. Weaver	Date: 12-21-11 Time: 1600	1. Received by: Mike Gunderson	Date: 12/22/11 Time: 8:30
2. Relinquished by:	Date: Time:	2. Received by:	Date: Time:
3. Relinquished by:	Date: Time:	2. Received by:	Date: Time:

Comments:

APPENDIX J

RESPONSE TO COMMENTS

Response to Comments - OEPA
Draft Ash Pit 1 and Ash Pit 3
Site Characterization Report Addendum for Coal Yard No. 1
Former Plum Brook Ordnance Works, Sandusky, Ohio
(Report dated June 2012)

Reference: Comments from Dr. Janusz Z. Byczkowski, DERR, CO, email dated July 6, 2012.

Comment 1: **Section 1.4, Page 1-3, Line #21; This document states: "…*NASA's inactive reactor, which is presently in the process of being decommissioned*…". This statement does not reflect the up to date accomplishments (as of June 2012). The term "*presently*" should correspond to the date of the document.**

Please update statements regarding condition of the Site, to correspond to the date of the document.

Response 1: Information of the present status, as of August 2012, of the nuclear reactor decommissioning will be included at the end of the referenced paragraph.

Comment 2: **Section 4.2.2, Page 4-4, Line #7; This document states: "…*Each BSC is the calculated 95th percent upper tolerance limit or the maximum detected concentration of the background data set, whichever value is lower, for each relevant analyte (IT Corporation, 1998)*…". The described method of background level (BSC) calculation is currently not recommended by OEPA-DERR (2009). Actually, the Table 5-1 may illustrate inadequacy of BSCs to this area of concern (in many cases BSCs area more than an order of magnitude higher than the respective maximum concentrations detected in this AOC). The use of methodology not recommended by OEPA-DERR should be emphasized and justified.**

Reference: OEPA-DERR (2009) **Use of Background for Remedial Response Sites. On-line:** **http://www.epa.ohio.gov/portals/30/rules/Use%20of20Background%20for%20RR%20Sites.pdf .**

Please emphasize a different background screening approach than that currently recommended by OEPA-DERR and provide justification.

Response 2: Text consistent with the following will be added to this text: *"It is noted that the method agreed upon for the development of BSCs by OEPA and USACE, as recorded in the September 11, 2002 PBOW team meeting minutes, differs from that shown in current OEPA (2009) guidance. This PBOW team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2009) guidance.*" We note that the concentrations of inorganics in Coal Yard No. 2 soil are low relative to other PBOW sites.

Reference used in the Response:

Ohio Environmental Protection Agency (OEPA), 2009***, Use of Background for Remedial Response Sites***, Technical Decision Compendium, Division of Environmental Response and Revitalization, August 21.

APPENDIX H

ASH PIT NO. 3 BHHRA

Shaw Environmental
& Infrastructure, Inc.

Final
October 2013

Baseline Human Health Risk Assessment
Ash Pit No. 3 and Addendum for Coal Yard No. 3
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps of Engineers
Nashville District

Final
October 2013

Baseline Human Health Risk Assessment
Ash Pit No. 3 and Addendum for Coal Yard No. 3
FUDS Project No. G05OH001821
Former Plum Brook Ordnance Works, Sandusky, Ohio

CB&I
312 Directors Drive
Knoxville, TN 37923
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Steven.Downey@CBIfederalservices.com

October 30, 2013

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Paula Coleman)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Subject: ***Submittal of the Final Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 and the BHHRA and Screening-Level Ecological Risk Assessment Addenda for Coal Yard No. 3***
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. Coleman:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 awarded to Shaw Environmental & Infrastructure, Inc., a CB&I company, we are pleased to submit the Final Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 (AP3), and the final Addenda to the AP3 BHHRA and Screening-Level Ecological Risk Assessment for Coal Yard No. 3 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report was prepared consistent with other PBOW risk assessment reports, U.S. Environmental Protection Agency guidance, and the AP3 risk assessment work plan.

Enclosed for your records are four copies of this report. Copies have also been sent to those on the distribution list as indicated for their records. As requested, the document was sent to the Center of Expertise (CX) and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven. T. Downey, PE, PMP
Project Manager

Please Reply To: Steven T. Downey
Phone: 865 694 7496
E-Mail Address: Steven.Downey@CBIfederalservices.com

Control Copy Distribution List

Name	Control Copy
U.S. Army Engineer District, Nashville ATTN: CELRN-EC-E (Ms. Paula Coleman) 110 Ninth Avenue South, Room 682 Annex Nashville, TN 37203	1-4
U.S. Army Engineer District, Huntington ATTN: CELRH-PM-PP-P (Mr. Rick Meadows) 502 Eighth Street Huntington, West Virginia 25701-2070	5-7 (CD provided)
Mr. Paul Jayko Site Coordinator Division of Emergency and Remedial Response (DERR) Ohio Environmental Protection Agency 347 North Dunbridge Road Bowling Green, Ohio 43402-0466	8, 9
Mr. Brian Tucker Ohio Environmental Protection Agency Division of Emergency and Remedial Response (DERR) Central Office Lazarus Government Center 50 W. Town Street, Suite 700 Columbus, OH 43216-1049	10
Mr. Robert Lallier Environmental Coordinator NASA - Plum Brook Station 6100 Columbus Avenue Sandusky, Ohio 44870	11
U.S. Army Corps of Engineers (**electronic only**) HTRW Center of Expertise ATTN: CEHNC-CX-EG (Vern StJohn) 1616 Capitol Avenue Omaha, Nebraska 68144-3869	(CD provided)
Mr. John Blakeman (**electronic only**) PBOW RAB Co-chairman 2412 Scheid Road Huron, Ohio 44839	(CD provided)
Mr. Jeffrey G. Leach US Army Public Health Command ATTN: MCHB-IP-REH, BLDG E1675 Aberdeen Proving Grounds, MD 21010-5403	12

DISCIPLINE SIGN-OFF REVIEW

Shaw Environmental & Infrastructure, Inc.

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 3 BHHRA
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 42000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
X	Report	Baseline Human Health Risk Assessment	**Document Status**
☐	Risk Assessment / Evaluation		☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
☐	Other:		☐ Other:

	Required Person	Signature	Date
Originator	Tom Siard		10-30-13
Editor	Donald Groseclose		10-30-13
Peer Review	Jon Lindberg		10-30-13
Technical Review	Michael Gunderson		10-30-13
Quality Assurance Mgr	Ken Martinez		10-30-13
Project Manager	Steven Downey		10-30-13

NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 3
Baseline Human Health Risk Assessment
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

Prepared for:

U.S. Army Corps of Engineers
P.O. Box 1070
Nashville, Tennessee 37202-1070

Prepared by:

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)
312 Directors Drive
Knoxville, Tennessee 37923

Shaw Project No. 132457

October 2013

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List of Acronyms

ABS	dermal absorption factor
AF	soil-to-skin adherence factor
AP3	Ash Pit 3
bgs	below ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentration
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDI	chronic daily intake
cm/hour	centimeters per hour
cm^2	square centimeter
COPC	chemical of potential concern
CSEM	conceptual site exposure model
°F	degrees Fahrenheit
DA	dose absorbed per unit body surface area per day
D&M	Dames and Moore, Inc.
DM	dry matter
DNT	dinitrotoluene
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EPC	exposure-point concentration
ET	exposure time
FI	fractional term
FUDS	Formerly Used Defense Sites
GAF	gastrointestinal absorption factor
gpm	gallons per minute
g	gram
g/kg-day	grams per kilogram of body weight per day
g/m^3	grams per cubic meter
GSA	General Services Administration
HHEM	human health evaluation manual
HI	hazard index
HQ	hazard quotient
ICI	International Consultants Incorporated
IEUBK	Integrated Exposure Uptake Biokinetic

List of Acronyms *(Continued)*

ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
IT	IT Corporation
kg	kilogram
kg/day	kilograms per day
K_p	permeability coefficient
LMS	linearized multistage
L/cm^3	liters per cubic centimeter
L/day	liters per day
m^3	cubic meter
m^3/day	cubic meters per day
m^3/hr	cubic meters per hour
m^3/kg	cubic meters per kilogram
m/second	meters per second
MDC	maximum detected concentration
$\mu g/m^3$	micrograms per cubic meter
mg/cm^2	milligrams per square centimeter
mg/cm^2-day	milligrams per square centimeter per day
mg/m^3	milligrams per cubic meter
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
µg/L	micrograms per liter
mg/L	milligrams per liter
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OEPA	Ohio Environmental Protection Agency
PAH	polycyclic aromatic hydrocarbon
PBOW	Plum Brook Ordnance Works
PDT	Project Delivery Team
PEF	particulate emission factor
PRG	preliminary remediation goal
RBSC	risk-based screening concentration
RfC	reference concentration

List of Acronyms *(Continued)*

RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
RSL	regional screening level
SF	cancer slope factor
Shaw	Shaw Environmental & Infrastructure, Inc.
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
UCL	95th percent upper confidence limit on the arithmetic mean
UF	uncertainty factor
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
WRS	Wilcoxon Rank Sum
WWTP3	Waste Water Treatment Plant No. 3

Executive Summary

A baseline human health risk assessment (BHHRA) was conducted to evaluate risks associated with exposure to soil, groundwater, surface water and sediment at Ash Pit 3 (AP3) at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. The approach used in the BHHRA is consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions and agreements between the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville and Huntington Districts, and Shaw Environmental & Infrastructure, Inc (a CBI company).

Site History/Description. The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene, and pentolite. Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts from the mid-1950s until 1963.

Accountability and custody for the entire portion of the former PBOW property that had been under the accountability and custody of the Department of the Army were transferred to the National Aeronautics and Space Administration (NASA) on March 15, 1963. NASA performed further decontamination efforts during 1964. NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status.

Three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal storage area, and an aboveground fuel storage tank. The fuel storage tank was surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room.

Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The powerhouses generated steam that was used for space heating, driving compressors, and generating electrical power. Coal ash waste from each of the boilers in the powerhouses was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit." AP3 was associated with Powerhouse 3.

AP3 is located approximately 700 feet southwest of the intersection of Maintenance and Ransom Roads and is west of the former NASA K-Site Test Facility research building (former Powerhouse 3). The pit is partially surrounded by thick vegetation, including a mixture of mature and smaller trees with a dense understory. Boundaries of the pit appear to be the same as the original boundaries, with the exception of an indention to the west on the eastern boundary. During its operation, the K-Site supplied noncontact cooling water to AP3. The original impoundment was intact as of 1999, holding water supplied by NASA's K-Site Test Facility. A pipe at the northeastern corner of the pit supplied the cooling water. Operations at the K-Site were officially abandoned in 2007. Water discharged from this former ponded area via an east-west-trending drainage ditch that eventually discharges into Pipe Creek. Since the K-Site ceased operations, the apparent major source of water to AP3 has been eliminated. A pair of eagles was found to be nesting near AP3.

Approach. The BHHRA evaluated exposure to chemicals in surface soil, subsurface soil, overburden groundwater, surface water, and sediment for cancer risks and noncancer hazards. Only validated analytical data were used in the BHHRA. Validated analytical data from samples other than groundwater include those collected during 2008 and 2009, as reported in the 2010 site characterization report, and those collected in 1999 and reported in the limited site investigation report. Groundwater data includes those analytical results from samples collected in 2011 and 2012, as reported in the site characterization report addendum. It is noted that the Ohio Department of Natural Resources guidance prohibits operating large machinery within a radius of 660 feet of the eagle's nests. Therefore, the presence of this nest resulted in modifications to the groundwater sampling protocol.

The standard steps of risk assessment, including data analysis, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis, were executed in the AP3 BHHRA. A screening for chemicals of potential concern (COPC) was used to focus the evaluation on those chemicals most likely to present a risk to potentially exposed individuals. This screening

included a risk-based screening and, for inorganics in soil, a background screening. This background screening protocol, which is based on PBOW Project Delivery Team agreement, differs somewhat from the current Ohio Environmental Protection Agency guidance. Use of this method for the screening of background ensures consistency between all of the PBOW project sites.

Each COPC in each medium was evaluated for exposure via the relevant exposure pathways and the resultant risk and hazards were estimated. One or more COPCs were found in each AP3 environmental medium except for surface water, indicating that surface water does not contribute significantly to risks. The receptors listed below were evaluated for exposure to the COPCs and their associated hazards and risks, with media evaluated for each receptor shown in parentheses:

- Current groundskeeper (surface soil)
- Future groundskeeper (combined surface and subsurface soil [referred to as "total soil"], overburden groundwater)
- Indoor worker (surface soil, subsurface soil [air pathway only], overburden groundwater)
- Current/future construction worker (total soil, surface water, sediment)
- Hypothetical future site resident (total soil, surface water, sediment, overburden groundwater)
- Future hunter (surface soil)
- Future hunter's child (surface soil [venison pathway only]).

Although no COPCs were found in surface water, this medium is still regarded as evaluated.

Note that there is currently no groundskeeper at AP3, but the current groundskeeper is included because current land use does not prohibit the presence of a groundskeeper or other on-site workers. Even though hunting is not currently permitted at AP3, hunting is permitted in other areas within PBOW; therefore, future use of AP3 for hunting is evaluated in this BHHRA. No construction is planned for AP3, but a construction worker is assumed to be potentially exposed under current or future land use. The future groundskeeper, indoor worker, and resident are evaluated for future land use; these three receptors are also evaluated assuming groundwater use as potable water. Overburden groundwater and bedrock groundwater are evaluated for each receptor separately. Because AP3 is a low-lying former impoundment and seasonally inundated, the site would need to be covered with a few feet of soil before construction could commence;

therefore, exposure to a future receptor would likely involve minimal exposure to current AP3 soil.

Results/Conclusions. Risks were characterized for each COPC identified in each medium for the relevant receptors. Noncancer hazards were evaluated against a target hazard index (HI) goal of 1 and to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) acceptable cancer risk range of 1E-6 to 1E-4 (i.e., a rate of 1 additional incidence of cancer per 1,000,000 to 1 in 10,000 individuals exposed), which is referred to herein as the "NCP risk management range." Cancer risk results were also compared to the PBOW Project Delivery Team target incremental lifetime cancer risk (ILCR) goal of 1E-5 (i.e., 1 additional incidence of cancer per 100,000 individuals exposed). A target cancer risk goal of 1E-5 is also used by the Ohio Environmental Protection Agency. This value was selected by the PBOW Project Delivery Team as a basis to consider remedial action, as it is the logarithmic midpoint of the NCP risk management range. Use of this 1E-5 goal represents a departure from the Army's practice of consistently using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations.

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk goal (ILCR>1E-5) are shown as bold, and exceedances of the noncancer hazard goal (HI>1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics. Please note that initial evaluations resulted in ILCR values that exceeded the PBOW cancer risk goal. However, these cancer risks that resulted in ILCR values were mostly associated with arsenic, which is evidently unrelated to former site activities. Therefore, ILCR values were recalculated excluding the contributions of arsenic in soil and/or groundwater for the receptors with initial ILCR values greater than 1E-5.

- Current groundskeeper: ILCR = **2E-5** (1E-6 excluding background-related arsenic in surface soil); HI = 0.2
- Future groundskeeper: **ILCR = 6E-5** (1E-6 excluding background-related arsenic in total soil); HI = 0.1
- Future groundskeeper excluding groundwater: ILCR = **2E-5** (9E-7 excluding background-related arsenic in total soil); HI = 0.1
- Future indoor worker: ILCR = **5E-5**; HI = 0.7
- Future indoor worker excluding groundwater: ILCR = 8E-6; HI = 0.1
- Construction worker: ILCR = 1E-6; HI = 0.4

- Hypothetical future resident: ***ILCR = 2E-4***; ***child HI = 5; adult HI = 2***
- Hypothetical future resident excluding groundwater: ILCR = **6E-5** (5E-6 excluding background-related arsenic in soil); child HI = 1; adult HI = 0.1
- Future hunter: ILCR = 1E-6; HI = 0.009
- Future hunter's child: HI = 0.000001; none of the carcinogenic COPCs are bioaccumulative; cancer risks are assumed to be de minimis.

The ILCR value for each of the AP3 exposure scenarios is within (or less than) the NCP risk management range and the PBOW cancer risk goal of 1E-5, if non-site-related arsenic in soil and groundwater is excluded from the evaluations.

The HI values of each of the AP3 receptors, except the future adult and child resident, meet the noncancer target HI of 1. Arsenic and manganese in overburden groundwater are responsible for the elevated HI values for the adult and child resident. The sources of these inorganics in groundwater are evidently unrelated to former site operations, and they appear to be naturally occurring.

No construction is currently planned at AP3, and no groundskeeping of any sort appears to be occurring at AP3. Because AP3 is in a low-lying former impoundment and frequently inundated, additional soil would need to be added before construction could occur at the site. Therefore, potential exposure to current AP3 surface or subsurface soil is likely minimal and the associated risks/hazards for any receptor in this BHHRA that assumes future development (i.e., each receptor except the hunter and hunter's child) are likely exaggerated.

1.0 Introduction

This baseline human health risk assessment (BHHRA) evaluates potential human health risks associated with exposure to soil, groundwater, surface water, and sediment associated with Ash Pit No. 3 (AP3), located at the former Plum Brook Ordnance Works (PBOW), Sandusky, Erie County, Ohio. This work is being conducted by Shaw Environmental & Infrastructure (Shaw) (a CB&I company) for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites (FUDS), managed by the USACE Huntington District, and technically overseen by the USACE Nashville District.

This BHHRA is consistent with U.S. Environmental Protection Agency (EPA) guidance and with the procedures established in the BHHRA for TNT Area A (TNTA) and TNT Area C (TNTC) soil (IT Corporation [IT], 2001a), the BHHRA for groundwater at PBOW (Shaw, 2006) and, most specifically, the AP3 BHHRA work plan (Shaw, 2009).

In this BHHRA, the term "facility" refers to the entire former PBOW property, and the term "site" refers to areas within PBOW under investigation, in this case AP3.

1.1 Facility Location and Description

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene (DNT), and pentolite (International Consultants Incorporated [ICI], 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNTA, TNT Area B (TNTB), and TNTC.

Twelve process lines were used in the manufacture of TNT: four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration (GSA). This transfer did not include the Plum Brook Depot area, also known as the Magazine Area, which consists of 2,800 acres. The Department of the Army reacquired the 3,230 acres in 1954. In 1955, the Army completed further decontamination of the manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds. The Army continued cleanup efforts until 1963.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; then removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were covered with fill material. All materials, including the soil in those areas, were flashed; the area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc. [D&M], 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. This excess included former buffer areas that had not been used by the Army and were thus not subject to decontamination efforts. The Perkins Township Board of

Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The GSA retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the Site Management Plan (ICI, 1995).

1.3 Ash Pit No. 3 Description and History

As noted in Section 1.2, PBOW was built in early 1941 and manufactured TNT, DNT, and pentolite until 1945. Three power stations, Powerhouse 1, Powerhouse 2, and Powerhouse 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main powerhouse, a coal storage area, and an aboveground fuel storage tank. Coal Yard No. 3, which is located immediately to the south of Powerhouse No. 3 and immediately east of Ash Pit No. 3, is approximately 1 acre in size. Coal Yard No. 3 is evaluated separately (please see the Addendum for Coal Yard No. 3, which is appended to this report following the AP3 BHHRA). Each powerhouse building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The powerhouses generated steam that was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the powerhouse was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each powerhouse. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit" (ICI, 1995). AP3 was associated with Powerhouse 3. The location of AP3 is shown on Figure 1-2.

AP3 is located approximately 700 feet southwest of the intersection of Maintenance and Ransom Roads and is west of the former NASA K-Site Test Facility research building (former Powerhouse 3) (Figure 1-2). The pit is partially surrounded by dense vegetation, including both mature and smaller trees. Boundaries of the pit appear to be the same as the original boundaries, with the exception of an indention to the west on the eastern boundary (USACE, 2000). During NASA's operation of K-Site they released noncontact cooling water to AP3. In 1999 the original impoundment was still intact and held used K-Site cooling water (USACE, 2000). A pipe at the northeastern corner of the pit discharged the K-Site cooling water into AP3. It is possible that this is the original pipe that once supplied the ash slurry to the pit during PBOW operations. Operations at the K-Site were officially abandoned in 2007, and the former Powerhouse 3 building is scheduled by NASA for demolition in 2013. Abandoned railroad tracks running in a north-south direction are located immediately east of AP3. Water was discharged from this former ponded area via an east-west-trending drainage ditch that eventually discharges into Pipe Creek (USACE, 2000). Since the K-Site ceased operations, the apparent major source of water to

AP3 has been eliminated. The presence or lack of standing water associated with various site visits and recent aerial photographs are described in further detail in Section 3.1.1.5.

A pair of bald eagles (*Haliaeetus leucocephalus*) was found to be nesting near AP3. Bald eagles are a threatened species in the state of Ohio. It is noted that the Ohio Department of Natural Resources guidance prohibits operating large machinery within a radius of 660 feet of an active eagle nest. Therefore, the presence of this nest resulted in modifications to the groundwater sampling protocol (Section 2.1).

1.4 Groundwater Use and Site Use

Two groundwater aquifer systems are utilized for drinking water in the region: a carbonate aquifer to the west and a shale aquifer to the east (Shaw, 2005). PBOW is located within the transition of the two systems. Over 170 private drinking water wells permitted by the Erie County Health Department are located within 4 miles of PBOW. Groundwater is not used on the PBOW facility. Permits are not required for agricultural wells. The Erie County Health Department does not permit using surface water as private drinking water. A shallow discontinuous and variably saturated groundwater system exists within the unconsolidated material atop the bedrock under much of the site.

Current use of the PBOW facility is classified as industrial for the purpose of identifying plausible human receptors and exposure pathways for evaluation in the BHHRA. D&M (1997) describes potential future uses of all or portions of the facility as follows:

- Industrial use (NASA activities and programs) may continue.
- Portions of the site may be used for recreation by hunters and fishermen.
- Portions of the site may be sold to state or local government or private individuals (no land-use restrictions were mentioned).
- Parts of the facility may be used in the future for residential or agricultural purposes.
- Parts of the facility may be used for training by the National Guard.
- Construction activities may be performed during development of any of the sites.

In summary, future site uses of AP3 are considered to be industrial or residential for the purpose of developing receptor and exposure scenarios. There are no current NASA activities at AP3, but because PBOW is under NASA control, the potential for NASA activities at AP3 exists. Even though hunting is not currently permitted at AP3, hunting is permitted in other areas within

PBOW; therefore, future use of AP3 for hunting is evaluated in this BHHRA. It is conservatively assumed for purposes of this BHHRA that groundwater may be developed as a source of potable water in the future. Section 3.1.3 presents a discussion of receptors and exposure scenarios.

1.5 Protocol for the Baseline Human Health Risk Assessment

The BHHRA was performed consistent with the AP3 BHHRA work plan (Shaw, 2009). The AP3 BHHRA work plan was developed consistent with previous PBOW BHHRAs and is based on EPA, USACE, and Ohio Environmental Protection Agency (OEPA) guidance, including, but not limited to, the following:

- Ohio Environmental Protection Agency (OEPA), 2009a***, Use of U.S. EPA's Regional Screening Levels as Screening Values in Human Health Risk Assessments***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- Ohio Environmental Protection Agency (OEPA), 2009b***, Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for the DERR Remedial Response Program***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.

- U.S. Army Corps of Engineers (USACE), 1999, ***Risk Assessment Handbook, Volume I: Human Health Evaluation***, Engineer Manual EM 200-1-4.

- U.S. Environmental Protection Agency (EPA), 1989a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

- U.S. Environmental Protection Agency (EPA), 1991a, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors***, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

- U.S. Environmental Protection Agency (EPA), 1992, ***Guidance on Risk Characterization for Risk Managers and Risk Assessors***, Memorandum from F. Henry Habicht II, Deputy Administrator, to Assistant Administrators, Regional Administrators, February.

- U.S. Environmental Protection Agency (EPA), 1997a, ***Exposure Factors Handbook***, Office of Research and Development, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.

- U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

- U.S. Environmental Protection Agency (EPA), 2004a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental***

Guidance for Dermal Risk Assessment), Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

- U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.1 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

- U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.1 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/038, May.

- U.S. Environmental Protection Agency (EPA), 2011, ***ProUCL Version 4.1***, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm.

1.6 Report Organization

The remainder of this document is organized as follows:

- ***Chapter 2.0, Data Evaluation.*** Identifies data sources, evaluates data quality, identifies chemicals of potential concern (COPC), and provides a background screening and evaluation protocol. It is noted that the background screening protocol differs from the current OEPA (2009c) guidance as explained in Section 2.4.3.

- ***Chapter 3.0, Exposure Assessment.*** Presents a conceptual site exposure model (CSEM), including contaminant sources, contaminant release mechanisms, receptors, and exposure pathways; describes exposure-point concentrations (EPC); and presents methods for calculating chemical intake and contact rates.

- ***Chapter 4.0, Toxicity Evaluation.*** Describes the potential for cancer and/or noncancer human health effects, provides an estimate of the quantitative relationship between the magnitude of dose or contact rate and the probability and/or severity of adverse effects, identifies the toxicity values that are used in the BHHRA, and describes the development of dermal toxicity values.

- ***Chapter 5.0, Risk Characterization.*** Combines the output of the exposure assessment and toxicity assessment to quantify the risk to each receptor at AP3. Risks associated with exposure to all appropriate AP3 media are evaluated.

- ***Chapter 6.0, Uncertainty Analysis.*** Identifies uncertainties in all phases of the BHHRA and discusses their individual effects on the risk assessment results, focusing on those issues that are most likely to have the greatest effect on risk estimates and/or risk management decisions.

- ***Chapter 7.0, Summary and Conclusions.*** Provides a brief summary of the BHHRA, including quantitative results, uncertainties, and pertinent site information. Summary and discussion is focused on those results and issues that are most directly relevant to the risk assessment conclusions for AP3 that are likely to directly affect site management decisions.

- ***Chapter 8.0, References.*** Presents the references used in the preparation of this document.

2.0 Data Evaluation

Data evaluation consists of a description of the appropriate data sources for each AP3 environmental medium sampled, a discussion of data quality, a description of the methodology used for identification of the COPCs, and a summary of the COPCs for each environmental medium.

2.1 Data Sources

All soil, groundwater, sediment, and surface water samples from which the validated analytical data used in the BHHRA were derived are presented in Table 2-1. These data include surface soil, subsurface soil, overburden groundwater, surface water, and sediment.

Note that groundwater sampling activities were modified because of a pair of nesting bald eagles located nearby; Ohio Department of Natural Resources guidance prohibits operating large machinery within a radius of 660 feet of an active eagle nest. Therefore, monitoring wells were installed using direct-push technique during August 2011, after eagle nesting activities were completed. The wells were sampled in December 2011 using low-flow sampling. During the May 2012 sampling event, precautions were taken to minimize disturbance to the nesting eagles, as this was within the nesting period. As part of these precautions, the wells were sampled using Snap Samplers™ as described in the site characterization report addendum (Shaw, 2013).

The sample summary table identifies each sample used in the BHHRA and the associated analytical suite. Samples included those collected as part of the limited site investigation for AP3 (USACE, 2000) and the remedial investigation (RI) samples (Shaw, 2010; 2013). All AP3 sampling locations are shown on Figure 2-1.

2.2 Sorting the Analytical Data

Prior to initiation of BHHRA calculations, a database of chemicals present in site samples was compiled for each environmental medium. This database includes all chemicals detected as described in the site characterization report (Shaw, 2010), the site characterization report addendum (Shaw, 2013), and the limited site investigation report (USACE, 2000). The surface soil and subsurface soil are considered separate media. Surface and subsurface soil data are typically combined to assess exposures under the construction worker, future groundskeeper, and residential site use scenarios, which would likely occur after surface and subsurface soil had been excavated and/or mixed. Combined surface and subsurface soil data are termed “total soil” in the BHHRA. However, it is understood that a reference to the evaluation of exposure to total

soil is actually an evaluation of exposure to both surface soil and subsurface soil. The total soil COPC list is created by combining the list of COPCs identified in surface and subsurface soil. If a chemical is either a surface soil COPC or a subsurface soil COPC (or both), then that chemical is a total soil COPC. The EPCs for total soil are typically generated from the combined data sets, as was done for AP3 soil.

Surface soil is defined as samples collected from within the interval of 0 to 1 foot below ground surface (bgs), and subsurface soil is defined as samples collected from depths greater than 1 foot bgs per the RI work plan (Shaw, 2008a). The limited site investigation (USACE, 2000) historical surface soil samples were collected from a depth of either 0 to 0.5 or 1.0 foot bgs. As possible, the RI subsurface soil samples are generally collected at depths of 3 to 5 and 8 to 10 feet bgs. Where refusal or the water table was encountered before a depth of 10 feet bgs, samples are collected from the deepest 2-foot interval above the water table. Because the water table at AP3 is shallow, all subsurface soil samples were collected from within an aggregate depth range of 0.8 to 5 feet (Table 2-1).

2.3 Evaluation of Data Quality

The quality of the analytical data was evaluated to select data for inclusion in the BHHRA. Data quality is expressed by the assignment of qualifier codes during the analytical laboratory quality control process or during third-party data evaluation. Some of the more common qualifiers and their meanings are as follows (EPA, 1989a):

- U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.
- J - Value is estimated, usually below the reporting limit.
- N - The analysis indicates an analyte for which there is presumptive evidence to make a tentative identification.
- NJ - The analysis indicates a “tentatively identified analyte” and the reported value represents its approximate concentration.
- UJ - The analyte was not detected above the reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - Quality control indicates that the data are unusable (chemical may or may not be present).

B - The concentration in the sample is not sufficiently higher than concentration in the blank, using the 5-times, 10-times (5x, 10x) rule, which states that a chemical is considered a nondetect unless its concentration exceeds 5 times the blank concentration. For common laboratory contaminants (acetone, 2-butanone [methyl ethyl ketone], methylene chloride, toluene, and the phthalate esters), the sample concentration must exceed 10 times the blank concentration to be considered a detection.

"J," "N," and "NJ" qualified data are treated in the BHHRA as detected concentrations; "R" data and "B" qualified chemical data are not used. "U" qualified data (nondetects) are treated in the BHHRA as nondetections. The use of data with other, less common qualifiers is evaluated on a case-by-case basis. Generally, data for which the identity of the chemical is unclear are not used in the BHHRA. If confidence is reasonably high that the chemical is present, but the actual concentration is somewhat in question, the data generally are used in the BHHRA. The analytical data evaluated in the BHHRA are included in Appendix A.

Some chemicals may be analyzed under two different analytical programs. For example, the DNT isomers are analyzed by EPA Method 8330 for nitroaromatics as well as EPA Method 8270C for semivolatile organic compounds. Risks associated with the reported values from both analyses are considered in the risk characterization (Chapter 5.0) and discussed if appropriate in the uncertainty analysis (Chapter 6.0), together with potential issues such as the relative sensitivities (i.e., differences in respective reporting limits) of the methods.

2.4 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC screening includes a risk-based screen which also considers status as a human nutrient (Section 2.4.1), a frequency-of-detection evaluation (Section 2.4.2), and a background screen (Section 2.4.3).

2.4.1 Risk-Based Screening

In the risk-based screen, the maximum detected concentration (MDC) of a chemical in a given medium is compared to the appropriate risk-based screening concentration (RBSC) for that chemical and medium. This is performed for each chemical in each medium. The units of the MDC and RBSC are the same for each chemical in a given medium. In groundwater, for example, both the MDC and RBSC have units of micrograms per liter (µg/L) in water.

If the MDC of a chemical is less than or equal to its RBSC, then the chemical is not considered further in the BHHRA for this medium because it is very unlikely that chemical concentrations at or below the RBSC would contribute substantially to risk. An analyte may be identified as a COPC if its MDC exceeds its RBSC. As indicated in Section 2.4, actual status as a COPC also depends on a chemical's frequency of detection (Section 2.4.2), concentration with respect to background (Section 2.4.3), and potential status as a nutrient. Groundwater RBSCs used in the BHHRA are derived from the EPA (2012a) regional screening level (RSL) table "tap water" values, and RBSCs for soil are derived from "residential soil" RSL values. This is a change in the source of the RBSCs for PBOW BHHRA work plans begun prior to March 2009 based on discussion between USACE and OEPA (2009d), and this change is consistent with recent OEPA (2009a) guidelines. Previously, the groundwater and soil RBSCs were derived from the corresponding EPA (2004b) Region 9 preliminary remediation goals (PRG). The soil RBSCs are applied to both surface and subsurface soil.

RSL values are based on a concentration equal to either an incremental lifetime cancer risk (ILCR) of 1E-6 or a noncancer hazard quotient (HQ) of 1, the threshold at (or below) which adverse noncancer effects are regarded as unlikely to occur. For the BHHRA, the noncancer values listed in the RSL tables are multiplied by a factor of 0.1 to provide additional protection for simultaneous exposure to multiple chemicals (OEPA, 2009a; EPA, 2012a). This results in RBSC values associated with an HQ of 0.1. For cancer risk, the RSL values based on an ILCR of 1E-6 were used directly as RBSCs in the BHHRA. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) identifies acceptable exposure levels that are generally associated with concentration levels that represent an excess upper bound lifetime cancer risk to an individual of 1E-6 to 1E-4 (EPA, 1990). This range is hereinafter referred to as the "NCP risk management range." Cancer risks associated with RSL values represent the lower end of this range. OEPA recognizes an overall cancer risk of 1E-5, which represents the logarithmic midpoint of the EPA risk management range, as a remedial goal (OEPA, 2009b). The RBSC for a chemical that elicits both cancer and noncancer health effects is selected based on either a cancer risk of 1E-6 or an HQ of 0.1, whichever associated concentration is lower.

Risks associated with exposure to AP3 sediment and surface water are also evaluated in the BHHRA. The AP3 surface water includes standing water in the far northeast corner of the site and the standing water in the drainage ditch located west of AP3. Although RSLs have not been developed specifically for sediment and surface water, RBSCs can be derived from the RSLs based on site conditions at PBOW and the types of exposure to these media that may reasonably be anticipated. The routes by which receptors may be exposed to sediment (i.e., incidental

ingestion or dermal contact) are similar to those by which receptors may be exposed to soil. However, sediment contact is expected to be appreciably less intense than soil contact, due to the lower duration and frequency of contact with sediment as compared with soil. Similarly, surface water exposure is expected to be much less intense than exposure to groundwater, as surface water from AP3 is not regarded as a plausible source of drinking water, partly because the Erie County Health Department does not permit using surface water as private drinking water and also because the drainage ditch does not contain nearly enough water for drinking water use. Consequently, the exposure frequency is expected to be much lower for surface water, and the incidental ingestion of surface water would be much lower than the assumed intentional ingestion and use of groundwater from the tap. For these reasons, OEPA (1999) stated that unadjusted tap water PRG values (i.e., HQ = 1; ILCR = 1E-6) should be used for screening PBOW surface water. This screening protocol was adopted specifically because it was agreed that the magnitude of exposure associated with PBOW surface water exposure would be far less than that associated with household tap water. In other words, it was agreed that analytes with a maximum concentration at the PRG level would not contribute appreciably to overall risks and hazards for PBOW sites based on the exposure pathways of the surface water exposure scenarios for PBOW. The same agreement was reached for screening sediment against unadjusted residential soil PRGs. This protocol has been updated to base sediment and surface water RBSCs on RSLs rather than PRGs, just as soil and groundwater RBSCs are currently based on RSLs. Even though the sediment and surface water RBSCs are an order of magnitude higher for noncarcinogens than the respective soil and groundwater RBSCs, these sediment and surface water RBSCs are regarded as protective of sediment and surface water receptors for screening because of the lower exposure rate to these media. Note that this previously made PBOW Project Delivery Team (PDT) agreement for screening surface water and sediment (OEPA, 1999), which considered site-specific conditions, is used for PBOW FUDS sites in place of the current OEPA (2009b) guidance. The current OEPA guidance simply states that adjusted RSLs (i.e., RBSCs) for soil may be used to screen contaminants in sediment and those for groundwater may be used to screen surface water. Use of this agreed PBOW PDT protocol ensures consistency in the evaluation of PBOW FUDS sites. The surface water RBSCs also meet the outside-of-the-mixing-zone average non-drinking water concentrations for the Lake Erie Basin.

The screening of lead in soil and groundwater is a special case. The EPA (2012b) Office of Water treatment technique action level of 15 µg/L for lead is listed in the RSL table, and the RSL user's guide recommends this level for use as an RSL. Lead exposure and risk is evaluated separately from other chemicals using the EPA (2004c) Integrated Exposure Uptake Biokinetic (IEUBK) model. The selection of the action level as the drinking water RSL is based partly on IEUBK model. Section 5.2 of the RSL user's guide states that if the average tap water

concentration exceeds 15 µg/L and the average soil concentration exceeds 250 milligrams per kilogram (mg/kg), then more than the IEUBK target (EPA, 2004c) of 5 percent of the population of exposed children would exceed 10 micrograms per deciliter of lead in blood. Because the Office of Drinking Water action level of 15 µg/L can be used to conservatively screen for a potential average concentration of 15 µg/L, this concentration is used as the RBSC. However, it is possible that the residential soil RSL of 400 mg/kg, which is selected as the soil RBSC, may not be protective of an average soil concentration of 250 mg/kg within a given data set. Therefore, the following conditions were placed on the screening of lead: 1) If either the soil RBSC or groundwater RBSC is exceeded, then the IEUBK blood-lead model is run using both average soil and groundwater concentrations, and 2) if the average soil concentration exceeds 250 mg/kg, then the IEUBK model is run, even if neither RBSC is exceeded, using average concentrations of lead in both soil and groundwater. Note that for AP3 total soil, the MDC for lead (20.4 mg/kg) is less than both the RBSC (400 mg/kg) and the criterion for average concentration (250 mg/kg), and lead was not detected in AP3 overburden groundwater samples. Therefore, the IEUBK model was not run for AP3 soil and groundwater.

There are no RSLs for sulfate in tap water, but the drinking water outside-of-the-mixing-zone average value of 250 milligrams per liter (mg/L) for the Lake Erie Basin is used as the RBSC. This value is the same as the secondary drinking water regulation of 250 mg/L (EPA, 2012b). Secondary drinking water regulations are nonpromulgated values, based on aesthetic characteristics, which are used as guidelines for public water systems. A health-based advisory level of 500 mg/L also exists for sulfate (EPA, 2012b).

The evaluation of essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required human nutrients. Essential nutrients such as calcium, chloride, iodine, magnesium, phosphorous, potassium, and sodium are generally considered innocuous at levels found in environmental media. There are no RSLs listed for these nutrients. Should any of these chemicals be identified as site related, an exposure analysis is performed whereby a daily dose of chemical from ingestion of the medium in question is calculated. The dose is compared with levels known or expected to be safe or toxic, and/or with recommended daily allowances, depending on the availability of data.

2.4.2 Frequency of Detection

When confidence is high that a given chemical is present, the data generally are used in the BHHRA. For most chemicals, their detection is presumptive evidence of their presence. As suggested by EPA (1989a), chemicals that are reported infrequently may be artifacts in the data that do not reflect the actual presence of the chemical in question. For the BHHRA, chemicals

that are reported only at low concentrations in less than 5 percent of the samples from a given medium are excluded from further consideration, unless the presence of a given chemical is expected based on historical information about the site. Chemicals detected infrequently at high concentrations may identify the existence of contaminant plumes or limited "hot spots" and are retained as COPCs.

2.4.3 Comparison to Background

A number of the chemicals detected in PBOW environmental media may have MDCs that exceed RBSCs but are part of normal background concentrations. Such chemicals may include inorganics and polycyclic aromatic hydrocarbons (PAH), a class of organic compounds which form from natural or anthropogenic combustion of organic matter, including fossil fuels, and are generally ubiquitous in the environment. Airborne PAHs associated with non-U.S. Department of Defense sources may be deposited on soil and leach to groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds, as well as PAHs, may also be associated with background concentrations due to the presence of natural petroleum-derived compounds in the vicinity of PBOW (Section 3.1.1).

Site concentrations of inorganic chemicals in site environmental media may be compared to those of PBOW background using a two-step approach: 1) background screening and 2) statistical data set testing. This second step (Section 2.4.3.2) is initiated only in cases where the concentration used for background screening is exceeded (Section 2.4.3.1) and is performed after the risk characterization (Chapter 5.0). The results of the statistical data testing are discussed in the uncertainty analysis (Chapter 6.0). No suitable background data set exists for overburden groundwater, so no background screening or statistical comparisons to background concentrations can be made for overburden groundwater samples. Similarly, no background screening or statistical evaluation can be performed for surface water or sediment analytical data, as these media lack PBOW background data sets.

Inorganics and organics are treated similarly from a quantitative perspective. However, all organics not eliminated on the basis of RBSC exceedance (Section 2.4.1) or infrequent detection (Section 2.4.2) are carried through the risk calculation process (exposure assessment, toxicity assessment, and risk characterization). As presented in Section 2.4.3.3, organic compounds are quantitatively eliminated as background related only through the uncertainty analysis if applicable.

2.4.3.1 Background Screening of Inorganics

Background screening is applied to each inorganic whose MDC in soil or limestone bedrock groundwater exceeds the RBSC and that cannot be characterized as an infrequently detected analyte. In background screening, the MDC is compared to the PBOW chemical-specific background screening concentration (BSC). The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998) (Table 2-2), and the background data set and derivation of BSCs for PBOW bedrock groundwater are described in the 2004 groundwater report (Shaw, 2005) (Table 2-3). It is noted that the method agreed upon for the development of BSCs, as recorded in the May 10, 2000 PBOW PDT (2000) meeting minutes, differs from that shown in current OEPA (2009c) guidance. Use of this method for the development of BSCs and as part of the COPC screening process ensures consistency between all of the PBOW FUDS project sites.

Summary tables of the background data sets for soil and groundwater are provided as Tables 2-2 and 2-3, respectively. The background soil samples were collected from near the property boundary, away from any potential source areas, and the background groundwater wells were installed in off-site areas upgradient of PBOW sources. Briefly, BSCs were calculated for use at PBOW based on concentrations found in these background soil and bedrock monitoring well samples. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (PBOW PDT, 2000). The background monitoring well samples were collected using low-flow samples and were unfiltered.

The background screening consists of comparing the MDC of the site data set to the BSC. The chemical may be regarded as a COPC if its MDC exceeds the BSC for that chemical or if no BSC can be determined due to a lack of detections in the background data set. COPCs are fully evaluated in the exposure assessment, toxicity assessment, and risk characterization. An inorganic analyte is not regarded as a COPC if its MDC is equal to or less than the BSC.

2.4.3.2 Statistical Data Set Testing of Inorganics

Statistical testing is performed to compare data sets of site inorganics data against the appropriate PBOW background data sets. As described in Section 2.4.3.1, the background data set for groundwater is presented in the 2004 groundwater report (Shaw, 2005), and the background data set for soil is presented in the site investigation for the acid areas (IT, 1998). As mentioned previously, background data sets do not exist for overburden groundwater, surface water, or sediment; therefore, a statistical background evaluation for COPCs in these media cannot be performed. The method for statistical comparison of the site data sets to the background data sets, described in Appendix M of Shaw (2005), is the Wilcoxon Rank Sum (WRS) statistical test

(also known as the Mann-Whitney U test). WRS testing is performed for inorganics having MDCs that exceed the respective BSCs and are identified as COPCs based on RBSC comparison (Section 2.4.1) and frequency of detection (Section 2.4.2). All COPCs are carried through the risk characterization process; thus, statistical testing results are not used to screen out any chemicals.

Site data sets are interpreted as being significantly different from PBOW background if the associated p-level is less than 0.05. WRS statistical output and box-and-whisker plots of the various inorganic COPC data sets are appended to the BHHRA for each inorganic data set evaluated against the appropriate site background data set; the WRS results are discussed as part of the uncertainties. Analytes shown by the WRS results to exceed background (or for which the WRS testing was not run) are assumed to be site related, unless a qualitative chemical-specific explanation is presented in the uncertainties analysis as to why the analyte should not be regarded as site related. The WRS is not run if the COPC was not detected in the PBOW background data set. Data sets for which the WRS results do not suggest site relatedness (i.e., site data and background data are not statistically different) are still evaluated for risks and hazards in the risk characterization (Chapter 5.0).

2.4.3.3 Treatment of Organic Compounds

As mentioned in Section 2.4.3, certain organic compounds (e.g., BTEX and PAHs) in site media may be attributable to background conditions. However, no organic compounds are summarily screened out. Instead, all detected organic compounds are carried through the risk assessment process (i.e., exposure assessment, toxicity assessment, risk characterization) unless screened out on the basis of comparison to RBSCs (Section 2.4.1) or characterized as infrequently detected (Section 2.4.2). Background contribution of organics are discussed in the uncertainties analysis, as applicable.

2.5 Data Evaluation Summary

Data summary tables are provided for the following media: surface soil (Table 2-4), subsurface soil (Table 2-5), total soil (Table 2-6), overburden groundwater (wells) (Table 2-7), sediment (Table 2-8), and surface water (Table 2-9). These tables provide the following information for each detected chemical in each environmental medium:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of reporting limits
- Arithmetic mean of site concentrations

- Appropriate BSC
- Appropriate RBSC
- Selection/exclusion of chemical as a COPC
- 95th percent upper confidence limit on the arithmetic mean (UCL) (for COPCs only)
- EPC (for COPCs only).

The estimation of the UCL values for COPCs is discussed in Section 3.2.1. For duplicate samples, the associated values are averaged in the data summary, if both samples are detects or if both are nondetects; if only one of the duplicates is a detect, then this detected value is used in the data summary.

The COPCs for each of the AP3 media are identified as follows:

- ***Surface Soil*** – Arsenic, thallium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene
- ***Subsurface Soil*** – Thallium
- ***Total Soil*** – Arsenic, thallium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene
- ***Overburden Groundwater*** – Arsenic, chromium, cobalt, iron, manganese, sulfate
- ***Sediment*** – Arsenic, chromium, benzo(a)pyrene, benzo(b)fluoranthene
- ***Surface Water*** – None.

As discussed in Section 2.2, the total soil COPCs include all surface soil and subsurface soil COPCs.

3.0 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989a). An exposure assessment includes the following steps:

- Characterize the physical setting.
- Identify the contaminant sources, release mechanisms, and migration pathways.
- Identify the potentially exposed receptors.
- Identify the potential exposure pathways.
- Estimate exposure concentrations.
- Estimate chemical intakes or contact rates.

The BHHRA characterizes potential exposures to COPCs in AP3 environmental media as portrayed by the CSEM in Section 3.1. Note that these environmental media include soil, groundwater, surface water, and sediment.

3.1 Conceptual Site Exposure Model

The CSEM provides the basis for identifying and evaluating the potential risks to human health in the BHHRA. The CSEM, graphically depicted on Figure 3-1, includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways. This presentation of all possible pathways by which a potential receptor may be exposed, including all sources, release and transport pathways, and exposure routes, facilitates consistent and comprehensive evaluation of risk to human health and helps to ensure that potential pathways are not overlooked. The elements of a CSEM include the following:

- Source
- Source media (i.e., initially contaminated environmental media)
- Contaminant release mechanisms
- Contaminant transport pathways
- Intermediate or transport media
- Exposure media
- Receptors
- Routes of exposure.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium (e.g., ingestion or dermal contact).

The receptors and pathways on Figure 3-1 reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by

D&M (1997) and the sitewide groundwater investigation (IT, 1997). On Figure 3-1, asterisks identify exposure pathways that are complete and addressed in this BHHRA. Justification for exclusion of other pathways is provided in the Figure 3-1 footnotes, and the exclusion of other potential receptors is discussed in Section 3.1.3.8. No current or future exposure by off-site residents is evaluated. Most of the off-site residents are serviced by municipal water from surface water sources. Although there are numerous private groundwater wells in the vicinity, including eight within 1 mile of the facility boundary, none of these is used as a potable source.
Based on the investigations of other PBOW sites (e.g., Shaw [2008b]), natural hydrocarbons and hydrogen sulfide are known to be present within the bedrock limestone, and shale formation groundwater generally provides low yields and is of low quality; however, the groundwater underlying AP3 is not summarily excluded for consideration as a tap water source based on natural water quality parameters or general assumptions concerning yield. Therefore, given the presence of numerous off-site wells and the assumption of unrestricted future land use on site, the development of groundwater for hypothetical future on-site residential (or on-site worker) use as tap water is initially regarded as plausible for purposes of this BHHRA. Groundwater quality and potential use is discussed further in the risk characterization (Chapter 5.0) and uncertainty analysis (Chapter 6.0). It is important to note that the site-specific risk assessment, including the evaluation of future land uses and groundwater use, was performed to satisfy administrative requirements, including those described by FUDS regulations (USACE, 2004).

3.1.1 Physical Setting

AP3 is just west of the former NASA K-Site Test Facility research building (former Powerhouse 3) (Figure 1-2). Operations at the K-Site were officially abandoned in 2007, and the former Powerhouse 3 building is scheduled for demolition in 2013. AP3 is partially surrounded by thick, shrubby vegetation, as well as successional forest consisting of both mature and smaller trees.

The following sections describe the physical setting of AP3, including the climate and meteorology of the Sandusky region (Section 3.1.1.1) and the geology (Section 3.1.1.2), soil (3.1.1.3), hydrology (Section 3.1.1.4), and surface water characteristics (Section 3.1.1.5) of the area and of AP3 in particular. A general description of AP3 is provided in Section 1.3.

3.1.1.1 Climate/Meteorology

The climate in the Sandusky area is continental and strongly affected by Lake Erie. July is generally the warmest month (average high and low temperatures of 82 and 65 degrees Fahrenheit [°F], respectively), and January is generally the coldest (average high and low temperatures of 32 and 19°F, respectively) (The Weather Channel, 2004). On average, the first freezing day (low of 32°F or less) occurs in late October (average of three per month), and the

last freezing day falls in early May (average of one per month) (National Oceanic and Atmospheric Administration, 1990). The average annual precipitation for Sandusky is 34.5 inches per year, with a monthly average of more than 3 inches per month falling in April through September and less than 3 inches in each of the other seven months (The Weather Channel, 2004). Precipitation is fairly evenly distributed throughout the year, with the fewest precipitation days (0.01 inch or greater) per month (10) occurring during July, August, September, and October, and the most (15) occurring in December and January (City-Data.com, 2004). The mean annual wind speed is 10.3 miles per hour (City-Data.com, 2004), with winds predominantly from the southwest (Science Applications International Corporation, 1991). Sandusky area winters are cloudy, with 33 percent sunshine during November through February, as compared with to 65 percent sunshine during the summer months (City-Data.com, 2004).

3.1.1.2 Geology

Three formations, all of Devonian Age, outcrop across PBOW, each of which was encountered in the upper 100 feet of bedrock at PBOW (Shaw, 2005). The Delaware Limestone is the lowermost formation screened by site wells. It is characterized as a hard, dense, finely crystalline limestone and dolomite. The unit is typically buff colored and usually is described as fossiliferous. In the vicinity of PBOW, quarries mine limestone from the Delaware. Traces of natural petroleum-derived hydrocarbons and hydrogen sulfide are common in area quarries (Shaw, 2005).

No bedrock monitoring wells were installed at AP3, because the analytical results of overburden groundwater indicated no site-related contamination in the upper unit . However, at Waste Water Treatment Plant No. 3 (WWTP3), which is located approximately 300 feet north of AP3, petroleum was observed at depth in the rock cores of all three bedrock monitoring wells (Shaw, 2010). One of these WWTP3 wells, WWTP3-BEDGW-002, also exhibited high levels of hydrogen sulfide (>200 parts per million), which supports the assumption that bedrock groundwater in the general vicinity of AP3 is of naturally poor quality.

Overlying the Delaware Limestone is the Olentangy Shale. Two members of the Olentangy Shale have been characterized at the site: the Plum Brook Shale and the overlying Prout Limestone. The Plum Brook Shale is interpreted to consist of approximately 35 feet of bluish-gray, soft, fossiliferous shale containing thin layers of dark, hard, fossiliferous limestone. The Prout Limestone has been described as a 15-foot-thick unit which occasionally outcrops in a 1,000- to 2,000-foot-wide, northeast-striking band across the middle portion of PBOW. It is described as a dark-gray to blue, very hard, siliceous, fossiliferous limestone or dolomitic mudstone. The uppermost formation at the site is the Ohio Shale. Only one member of the Ohio

Shale, the Huron Shale, is present in the PBOW area. This unit has been described as black, thinly bedded, with abundant carbonaceous matter. Some large pyrite/carbonate concretions are also present in the Huron Shale, some as large as 6 feet in diameter (D&M, 1997). None of the AP3 wells were advanced through the shale; thus, definitive information concerning the thickness of the shale at AP3 is not available. However, the shale layer at WWTP3, located just north of AP3, was found to be 1.3 feet thick. This indicates that the shale layer at AP3 is likely to be similarly thin.

3.1.1.3 Soils

The bedrock overburden in Erie County is predominantly glacial till, glacial outwash, or glacial lacustrine (lake) deposits. In the vicinity of PBOW, the soil has been interpreted to be lacustrine. In many areas, the overburden also consists of highly weathered bedrock. The thickness of the overburden ranges from less than 1 foot to more than 25 feet. Overburden is thickest on the northern portion of the site in the vicinity of the Reactor Facility Area, where it has filled in a bedrock low (Shaw, 2005). The overburden in the vicinity of AP3 is approximately 28 feet, based on boring logs (Shaw, 2013).

The soil in the northwest portion of PBOW is placed within the Kibbie-Elnora-Tuscola-Colwood Association, which is described as nearly level to gently sloping. This soil is described as somewhat poorly drained, moderately well drained, and very poorly drained soils formed in outwash, lacustrine, and deltaic sediments. Along a strip from west to northeast across the site is the Castalia-Millsdale-Milton-Ritchey Association. This association is described as shallow to moderately deep, nearly level to moderately steep, well-drained and very poorly drained soils formed in glacial till, lacustrine sediments, and limestone residuum. Across much of the central portion of the site is the Hornell-Fries-Colwood Association, described as moderately deep to deep, nearly level to gently sloping, somewhat poorly drained to very poorly drained soils formed in glacial till and lacustrine sediments over shale bedrock. At the extreme southeast portion of PBOW is the Pewamo-Bennington Association, described as nearly level to gently sloping, very poorly drained and somewhat poorly drained soils formed from glacial till and lacustrine sediments.

3.1.1.4 Hydrology

The two main water-bearing zones at PBOW are located in the overburden/shale unit and the limestone bedrock and are thus called the overburden/shale and bedrock water-bearing zones. The overburden and shale groundwater units show similar water levels in these two units, suggesting substantial vertical communication. Therefore, these two geologic units are combined for purposes of PBOW groundwater evaluation. Data collected during the more recent

investigations (Shaw, 2005; IT, 1997, 1999, 2001b) indicate that groundwater in the overburden is in discontinuous pockets during dry time periods. The shallow overburden generally has low yields over most of PBOW due to the high percentage of silt and clay. In contrast, the limestone bedrock water-bearing zone is saturated year round. During periods of low precipitation, only limited migration of contaminants would occur in the overburden due to less infiltration.

Regional groundwater flow in both the overburden/shale and the limestone bedrock is to the north-northeast towards Lake Erie, although local flow may vary due to local topography. The general flow direction in the overburden water-bearing zone is to the north in the immediate vicinity of AP3. A hydrogeological study conducted by the U.S. Geological Survey (1992) in the glacial deposits of Sandusky in 1990 reported a horizontal hydraulic conductivity of 0.046 feet per day and a vertical hydraulic conductivity of 1.2 feet per day.

Water in the limestone typically occurs in joints and along bedding planes or in solutionally enlarged openings. The conceptual model interprets that bedrock groundwater flow in the Delaware Limestone water-bearing zone is influenced by the frequency, orientation, density, and connectivity of the bedrock fractures. These fractures result in localized groundwater flow direction toward the southeast in the vicinity of AP3.

At PBOW, the bedrock groundwater has been subdivided into three zones based on location and yield. Zone 1 occurs in the north and northwestern portion of PBOW. It has been characterized as yielding from 100 to 500 gallons per minute (gpm) from karstic limestone approximately 100 feet below grade. Zone 2 is in the northern portion of PBOW and has yields of 15 gpm or less from limestone approximately 300 feet below grade. Zone 3 is located in the eastern and southern portion of the site in predominantly shale bedrock. In addition to being found in the shale, groundwater is located in thin sand and gravel horizons interbedded with silt and clay deposits. Most Zone 3 wells are poor yielding, many of them providing less than 3 gpm (D&M, 1997). AP3 is likely in Zone 2.

3.1.1.5 Surface Water

AP3 had formerly been filled with water during former PBOW Powerhouse 3 and NASA K-Site operations. Water is still present at times in AP3. A drainage ditch extends from AP3 to the west. A few inches of standing water were present in this ditch during field reconnaissance and the RI sampling event, but no flow was evident.

3.1.2 Contaminant Sources, Release Mechanisms, and Migration Pathways

Contaminant sources, release mechanisms, and migration pathways are summarized on Figure 3-1. Briefly, AP3 received a coal ash slurry via a pipeline from Powerhouse 3, as described in Section 1.3. AP3 also received ash from the incinerators at WWTP 3. Depending on specific location, this coal ash layer is present at AP3 from the surface to a depth of up to 2.3 feet. Thus, the coal ash and any contaminants within it may represent surface and subsurface soil.

Leaching and downward migration may have carried contaminants from the subsurface soil to the groundwater. Surface water from the ditch located west of AP3 may have been impacted via surface drainage by contaminants originating from AP3. Also, standing water in the northeast corner of AP3 may have been impacted by contaminants leaching from AP3 soils and sediment.

3.1.3 Receptors and Exposure Pathways

Receptors selected to represent the upper bound on exposure from all plausibly exposed groups of people associated with AP3 as well as the pathways by which they may be exposed to chemicals are summarized on Figure 3-1 and in Table 3-1. The exposure variable values used in the contaminant intake models are compiled in Table 3-2. The receptors evaluated in the BHHRA are listed below:

- Current groundskeeper
- Future groundskeeper
- Indoor worker (future)
- Construction worker (current/future)
- Hypothetical on-site resident (future)
- Hunter (future)
- Hunter's child (future).

Note that the current (Section 3.1.3.1) and future (Section 3.1.3.2) groundskeeper scenarios include different environmental media and are, thus, listed separately. The construction worker may be viable under current or future land use. However, the evaluation for this receptor is exactly the same under current and future land use.

Most BHHRAs are based on a reasonable maximum exposure (RME) assumption. The intent of the RME assumption is to estimate the highest exposure level that could reasonably be expected to occur, but not necessarily the worst possible case (EPA, 1989a; 1991a). It is interpreted as reflecting the upper 90 to 95th percentile on exposure. In keeping with EPA (1989a; 1991a) guidance, variables chosen for a baseline RME scenario for ingestion rate, exposure frequency, and exposure duration are generally upper bounds. Other variables, such as body weight and exposed skin surface area, are generally central or average values. In the case of contact rates

consisting of multiple components, e.g., dermal contact with soil or water, which consists of a dermal absorption factor (ABS) and soil-to-skin adherence factor (AF) for soil, and permeability coefficient (K_p) and exposure time (ET) for water, only one variable, ABS or K_p, needs to be an upper bound. The conservativeness built into the individual variables ensures that the entire estimate for contact rate is sufficiently conservative.

The averaging time for noncancer evaluation is computed as the product of the exposure duration (years) multiplied by 365 days per year. The resultant noncancer averaging time is used to estimate an average daily dose over the entire exposure period (EPA, 1989a). For cancer evaluation, the averaging time is computed as the product of 70 years, the assumed human lifetime, times 365 days/year. This cancer-based averaging time is used to estimate an average daily dose prorated over a lifetime, regardless of the frequency or duration of exposure. The methodology used in deriving the averaging time for cancer risks assumes that the risk from short-term exposure to a high dose of a given carcinogen is equivalent to long-term exposure to a correspondingly lower dose, provided that the total lifetime doses are equivalent. This approach is generally consistent with the EPA (2005) policy of carcinogen evaluation, although it introduces considerable uncertainty into the BHHRA cancer risk estimates.

A fractional term (FI) is introduced into the chemical intake equations to account for scenarios in which exposure to a potentially contaminated medium associated with the site is less than total daily exposure to that medium. For example, if the site of interest is small or has unusual dimensions so that a groundskeeper would be unlikely to spend all (or nearly all) of his working time at the site, an FI value of less than 1 might be applied to the soil ingestion and dermal intake equations. An FI may also be split between two comparable media. For example, if a resident is exposed to both soil and sediment, FI values are introduced that apportion exposure between the two media such that the FI value for the two analogous media does not exceed a value of 1 (Section 3.1.3.5).

Receptors and the associated exposure pathways are presented in Sections 3.1.3.1 through 3.1.3.8. Please note that some of the pathways considered for the receptors (e.g., surface water exposure; volatile organic compounds [VOC] in soil) could not be quantitatively evaluated because pertinent chemicals associated with these pathways were not identified as COPCs.

3.1.3.1 Current Groundskeeper

The groundskeeper scenario is designed to evaluate the upper bound for long-term site worker exposure to surface soil in the current site use scenario and total soil in the future site-use

scenario. It is noted that no groundskeeper is currently working at the site, but current land use does not prohibit a site worker from performing groundskeeping activities at the site.

Exposure to surface soil is evaluated for a (potential) current groundskeeper. Total soil is typically evaluated under the future groundskeeper use scenario because hypothetical future construction may include considerable excavation of subsurface soil. This soil may be spread on the surface and regraded such that some of the soil currently in the subsurface (typically assumed to be 1 to 10 feet bgs) will be spread as surface soil (0 to 1 foot bgs). Groundwater use is also evaluated for the groundskeeper in the future site-use scenario, as discussed in Section 3.1, in which groundwater could theoretically be developed as a source of drinking water. It is assumed that any contact with surface water or sediment associated with AP3 by this receptor would be infrequent and sporadic, because such contact would not be a part of the groundskeeper's regular duties or activities. Therefore, exposure to these media is not quantified.

Direct soil exposure pathways include incidental ingestion and dermal contact. Inhalation of dust raised by lawnmowers or other equipment is also evaluated because relatively high dust concentrations may be produced within the groundskeeper's breathing zone, with little opportunity for dilution by the large volume of ambient air.

Surface soil that is contaminated with VOCs and that has been in place for extended periods is not a significant source of airborne VOCs, because infiltration and dissipation over time reduces residues at the surface (i.e., first few centimeters) from which volatilization would occur. However, as noted previously, the data set for surface soil may include samples taken from up to 1 foot bgs, which would include the soil zone deeper than the top few centimeters, where dissipation has not reduced VOC concentrations. In other words, the surface soil data set might indicate the presence of VOCs, although volatilization to the air is unlikely to be significant. Therefore, a surface soil-to-air volatilization model is not used in addition to the activity-based dust emissions model to estimate airborne concentrations of VOCs. Instead, the airborne concentrations estimated by the dust emissions model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust emissions model treats the VOCs as if they were located at the surface. It is assumed that VOC emissions from subsurface soil (i.e., at depths greater than 1 foot bgs) would be attenuated by the overlying soil so that concentrations in ambient air would not be toxicologically significant.

The groundskeeper is assumed to be a 70-kilogram (kg) adult who works 8 hours per day, approximately 5 days per week year-round on site for a total of 250 days/year for 25 years (EPA, 2004a). The respiratory rate for the groundskeeper is assumed to be 20 cubic meters (m^3) per

8-hour workday or 2.5 cubic meters per hour (m^3/hr) (EPA, 1991a), and the soil incidental ingestion rate is assumed to be 100 milligrams per day (mg/day) (EPA, 2002). The groundskeeper is assumed to be exposed dermally to soil. An exposed skin surface area of 3,300 square centimeters (cm^2) and a soil AF of 0.2 milligrams per square centimeter (mg/cm^2) are assumed (EPA, 2004a).

3.1.3.2 Future Groundskeeper

A future groundskeeper would be exposed to soil via the same exposure pathways as the current groundskeeper described in Section 3.1.3.1. However, the future groundskeeper scenario assumes that construction has taken place and that some of the soil currently in the subsurface has been brought to the surface during earthmoving activities. Therefore, the future groundskeeper is assumed to be exposed to a combination of surface and subsurface soil (total soil) rather than surface soil alone.

In addition, a hypothetical future groundskeeper is assumed to be exposed to groundwater, which could theoretically be developed as a source of drinking water in the future. His drinking water ingestion rate is assumed to be 1 liter per day (L/day) (EPA, 1991a). He may also experience dermal contact with groundwater used to clean equipment and to rinse dust or perspiration from his body. For this evaluation, it is assumed that the head, forearms, and hands, approximately 3,300 cm^2 of his body (EPA, 2004a), would be exposed intermittently for up to 1 hour/day. Because exposure is assumed to be intermittent rather than continuous, organic chemical uptake across the dermis would not reach steady state, which guides the selection of the EPA (2004a) model used to quantify this pathway (Section 3.3).

3.1.3.3 Future Indoor Worker

This hypothetical future receptor scenario was used to evaluate exposure to indoor airborne VOCs entrapped in a building. VOCs released from subsurface soil may enter a building through joints or cracks in the foundation or slab. The indoor worker is also potentially exposed to surface soil via incidental ingestion. Exposure to COPCs in surface soil via dermal contact and inhalation of airborne dust and VOCs from surface soil, although plausible, are expected to be less significant than incidental ingestion, because this receptor spends his work time indoors. Therefore, dermal contact and inhalation of dust and airborne VOCs from surface soil are not quantified separately from ingestion exposure (EPA, 2002). Under a future use scenario for this receptor, construction of a building would be necessary. This would require excavation and regrading of soil. Normally, when construction is involved, such as for the future groundskeeper or resident, total soil rather than surface soil would be evaluated for ingestion exposure. However, the chief purpose for this receptor is to evaluate exposure via vapor intrusion of

contaminants from subsurface soil into indoor air. Thus, the evaluation of direct contact with subsurface soil as a component of total soil would equate to "double counting" of COPCs in subsurface soil. Also, the groundskeeper reflects a worst-case exposure for a long-term worker with respect to direct contact with both surface soil and total soil. Therefore, direct contact with surface soil for the indoor worker is included to reflect a more complete exposure scenario, but direct contact with subsurface soil is most effectively addressed from an RME perspective by the groundskeeper.

The indoor worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week year-round on the site for a total of 250 days/year for 25 years (EPA, 2002). His incidental soil ingestion rate is assumed to be 50 mg/day (EPA, 2002), and his inhalation rate is assumed to be 20 m^3/8-hour workday (EPA, 1991a).

A future indoor worker is assumed to be exposed to groundwater, which could theoretically be developed as a source of drinking water (Section 3.1). His drinking water ingestion rate is assumed to be 1 L/day (EPA, 1991a). Some indoor worker positions may require relatively frequent dermal contact with groundwater as well, e.g., a food preparer/cafeteria worker who would wash his hands, produce, equipment, etc. For this evaluation, it is assumed that the head, forearms, and hands, approximately 3,300 cm^2 of his body (EPA, 2004a), would be exposed intermittently for up to 1 hour per day. Because exposure is assumed to be intermittent rather than continuous, organic chemical uptake across the dermis would not reach steady state, which guides the selection of the EPA (2004a) model used to quantify this pathway (Section 3.3.4).

3.1.3.4 Current/Future Construction Worker

The construction worker scenario is used to evaluate short-term exposure to surface and subsurface soil (total soil) in either the current or future land-use scenario. Construction projects are expected to be infrequent. It is assumed that the construction worker participates in only one construction project on the site. Note that no construction projects are anticipated for AP3, but this site is currently under NASA control and a construction project may be possible under current land use. Relevant exposure pathways include incidental ingestion and dermal contact, inhalation of dust raised by operating construction equipment, and inhalation of airborne VOCs released from subsurface soil during excavation and grading. Hypothetical exposure to groundwater by the construction worker is also possible under a future scenario; however, if on-site groundwater were developed as a tap water source, other potential future groundwater receptors such as the future groundskeeper would have longer and/or more frequent groundwater exposure. Therefore, groundwater exposure is not evaluated for the construction worker.

The construction worker may also be exposed to surface water and sediment associated with AP3 during projects such as installation of underground utilities or rerouting of surface flow. Sediment and especially surface water are relatively scarce at AP3, and exposure associated with these media for the AP3 construction worker would be correspondingly minimal to negligible. However, for the sake of consistency and in accordance with the work plan (Shaw, 2009), the construction worker exposure to surface water and sediment is being evaluated with the same protocol used for other PBOW sites. It is understood that AP3-specific issues associated with these media may lead to the risk characterization results being revisited, if appropriate, in the uncertainty analysis. Dermal contact is the most significant pathway for exposure to surface water. Incidental ingestion of surface water is also possible but is not expected to be nearly as significant as dermal contact. Inhalation of VOCs from surface water is also possible, but the large volume of outdoor air and natural air currents are expected to dilute airborne concentrations so that this pathway is expected to be less significant than dermal contact, which is quantified. For these reasons, incidental ingestion and inhalation of VOCs from surface water are not quantified separately from dermal contact. Dermal contact and incidental ingestion may be important pathways for exposure to sediment, and both are evaluated.

The construction worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week. This represents an annual exposure frequency rate of about 250 days per year, which is the same as described for the groundskeeper (Section 3.1.3.1) and indoor worker (Section 3.1.3.3). Construction projects involving soil exposure are assumed to last 6 months. The respiratory rate for the construction worker is assumed to be 20 m^3/8-hour workday (2.5 m^3/hr) (EPA, 1991a). A soil ingestion rate of 330 mg/day is assumed for the construction worker (EPA, 2002). A dermal soil AF for the construction worker of 0.3 mg/cm^2 and an exposed body surface area of 3,300 cm^2 are assumed, which represent the head, hands, and forearms (EPA, 2002; 2004a).

The construction worker may be exposed to surface water and sediment during the 6-month construction period. The construction worker dermal exposure parameters for sediment are assumed to be exactly the same as those for soil. Dermal exposure to surface water is assumed to occur for up to 4 hours per day, or one-half the normal work day. It is assumed the exposure to surface water is intermittent during this period. An exposed body surface area of 3,300 cm^2, the same as for sediment and soil, is assumed for exposure of the construction worker to surface water. It is expected that the construction worker would wear appropriate footgear and leg protection to minimize surface water and sediment exposure to the legs.

As mentioned previously, the exposure assumptions used in the evaluation of surface water and sediment exposure and included in the work plan (Shaw, 2009) are selected to be consistent with other PBOW sites. Therefore, these assumptions (e.g., body surface area available for exposure) are particularly conservative for AP3, where the presence of sediment and especially surface water, and the corresponding exposure, are minimal. As stated previously, this exposure assessment protocol is assumed for the AP3 surface water and sediment evaluation with the understanding that the risk characterization results based on the exposure assumptions can be revisited in the uncertainty analysis.

The construction worker scenario provides for several different kinds of construction projects, such as upland excavation and building projects (exposure primarily to soil), as well as stream rerouting (exposure primarily to surface water and sediment). It is unlikely, however, that a single construction worker would participate in all these activities during a given project. Therefore, the evaluation described above is probably overly conservative and may represent some double counting. For example, it is unlikely that the construction worker would be simultaneously ingesting soil, sediment, and surface water. Similarly, the air in his breathing zone is not likely to contain the reasonable maximum concentrations of COPCs estimated for soil while he is exposed to surface water. The potential for double counting is not expected to contribute significantly to total risk estimates summed across chemicals, pathways, and media. Should construction worker risk estimates exceed acceptable limits, risk and hazard estimates may be performed using refined exposure assumptions based on the physical characteristics of the site. For example, an upland excavation and building project may be assumed for one or more areas of the site, and a stream rerouting project may be assumed for another. Effectively, the risks and hazards associated with surface water/sediment exposure and soil exposure could be separated. This approach would more precisely reflect plausible exposure scenarios, reduce the likelihood of double counting, and more accurately identify risk-driving media and chemicals. These refined estimates would be presented in the uncertainty analysis.

3.1.3.5 Hypothetical Future On-Site Resident

The hypothetical future on-site residential scenario is used to evaluate long-term exposure to site soil, surface water, sediment, and groundwater under the future land-use scenario. Residential land use is plausible because property abutting the PBOW facility is residential. This type of land use is also consistent with assumed future land use of other PBOW sites such as TNTA and TNTC (IT, 2001a).

The hypothetical future on-site residential scenario is evaluated assuming a 30-year residential exposure scenario, considering exposure to a resident as a young child (6-year duration, ages 1

through 6 years) through the adult portion of life spent at this residence (24-year duration) (EPA, 1991a). Noncancer hazard estimates are derived separately for the child and adult life stages. Cancer risk is estimated as the sum of the risks calculated for the adult (24 years) and the child (6 years) (EPA, 2002; 2012c).

The hypothetical future resident is assumed to be exposed directly to total soil, because residential development would involve excavation and regrading, which would mix surface and subsurface soil. Relevant pathways for total soil exposure include incidental ingestion, dermal contact, and inhalation of dust and VOCs. Evaluation of VOCs from total soil is addressed during evaluation of airborne dust, as described for the groundskeeper. For evaluating inhalation of airborne dust, it is assumed that 80 percent of the soil surface is covered with pavement or vegetation. Inhalation of VOCs released from subsurface soil entrapped in indoor air is also evaluated. The hypothetical future resident is also assumed to be exposed to VOCs released from subsurface soil through cracks in the building foundation to indoor air. It is noted that because some of the subsurface soil is expected to be brought to the surface in the future, using only subsurface soil data will conservatively result in some double counting of exposure to any VOC COPCs that may be present in the subsurface soil. This can be addressed in the uncertainty analysis in cases where the subsurface soil-to-indoor air pathway significantly affects risk and hazard estimates. This pathway did not contribute significantly to risk at AP3, as no VOCs were identified as COPCs in subsurface soil.

It is assumed that, under hypothetical future residential land use, the overburden/shale water unit will be developed as a source of potable water (Section 3.1). The hypothetical resident is assumed to use groundwater underlying the site as the sole source of household tap water. Exposure to COPCs in groundwater would occur via ingestion, dermal contact during bathing/washing, and inhalation of VOCs released to the air during household use of tap water associated with multiple household uses.

The hypothetical future resident could be exposed to contaminants in AP3 surface water and sediment. Plausible exposure pathways include dermal contact with surface water and incidental ingestion and dermal contact with sediment. Incidental ingestion of surface water in a wading scenario is considered less significant than dermal contact and is not quantified separately from dermal contact. Inhalation of VOC emissions from surface water is also possible, but the large volume of outdoor air and natural air currents are expected to dilute airborne concentrations, so that this pathway is expected to be less significant than dermal contact, which is quantified. For these reasons, the inhalation of VOC emissions from surface water is not quantified separately from dermal contact.

The hypothetical future adult resident is assumed to be a 70-kg person with an incidental soil ingestion rate of 100 mg/day and an inhalation rate of 20 cubic meters per day (m^3/day) or 0.83 m^3/hr (EPA, 1991a). A body surface area of 5,700 cm^2, representing the hands, forearms, head, and lower legs, is assumed to be available for dermal exposure to soil (EPA, 2004a). A soil AF of 0.07 mg/cm^2 is used as the default RME value for the adult resident (EPA, 2004a). The adult resident is assumed to be exposed for 350 days/year for 24 years (EPA, 1991a; 2002).

The hypothetical future child resident is assumed to be a 1- through 6-year-old child with an average body weight of 15 kg, a soil ingestion rate of 200 mg/day, and an average inhalation rate of 10 m^3/day or 0.417 m^3/hr (EPA, 2004d). An average body surface area of 2,800 cm^2 throughout the 6-year childhood exposure period, representing the head, hands, forearms, lower legs, and feet, is assumed for dermal contact with soil (EPA, 2004a). A soil AF of 0.2 mg/cm^2 is used as the default RME value for the child resident (EPA, 2004a). The child resident is assumed to be exposed for 350 days/year for 6 years (EPA, 1991a; 2002).

It is assumed that the hypothetical future resident would visit the unnamed tributary to Plum Brook in the vicinity of AP3 surface water for 8 hours/day, 2 days/week during the warmer half of the year. This resident is assumed to wade for 3 hours/day on 52 days of the year. Mechanisms of exposure to soil and sediment are likely to be similar. Therefore, the incidental soil ingestion rate of 100 mg/day, the surface area of 5,700 cm^2, and the AF of 0.07 mg/cm^2 are also applied to sediment exposure in the adult. Similarly, the resident child soil ingestion rate of 200 mg/day, skin surface area of 2,800 cm^2, and soil AF of 0.2 mg/cm^2 are applied to sediment exposure for this receptor. Water within AP3 is typically less than 1 foot deep, and water within the drainage ditch west of AP3 is generally only a few inches deep and only intermittently present. The shallowness of the surface water would limit the surface area of the body that would typically be exposed. It is assumed that an adult body surface area of 7,000 cm^2 is available for exposure to surface water. This represents the same body parts to which soil and sediment would be exposed (i.e., hands, forearms, head, and lower legs) plus the feet (EPA, 1997a; 2004a). The body surface area of 2,800 cm^2, representing the hands, forearms, head, lower legs, and feet, used for soil and sediment exposure in the young child are also used for surface water exposure for this receptor.

EPA (1989a) permits the development of an FI to reflect the proportion of total daily exposure that a receptor obtains from potentially contaminated medium (Section 3.1.3). For this receptor, the FI is used to apportion the resident's time of exposure between site soil and sediment. It is assumed that the resident spends 16 hours/day awake and potentially exposed to soil or sediment. As previously noted, 350 days/year are available for contact with soil; 52 of those days are also available for contact with sediment. It is assumed that contact with soil and sediment does not

occur simultaneously; i.e., on those days when the resident spends time at the streams, 8 hours would be spent in contact with soil and 8 hours would be spent in contact with sediment. Therefore, the fraction of exposure to soil is 16 hours/16 hours = 1 on the 298 days without time spent at the streams, and the fraction of exposure to soil is estimated as 8 hours/16 hours = 0.5 on the 52 days with some time spent at the streams. A weighted fraction of 0.93 (rounded to 0.9) is estimated for exposure to soil over the entire 350 days/year exposure frequency. A weighted fraction of 0.07 (rounded to 0.1) is estimated for exposure to sediment over the entire 350 days/year exposure frequency.

A hypothetical future adolescent resident may be the most likely individual to have regular exposure to sediment and surface water associated with AP3. It is not expected that adults would regularly visit the AP3 surface water areas, as these areas do not support game fish and would seemingly not provide any attraction. It is unlikely that a young child (i.e., ages 1 through 6) would frequent these areas for substantial portions of time, because such young children (especially at the lower end of this age range) would require continued adult supervision. However, as described above, it is conservatively assumed that the resident will be regularly exposed to surface water and sediment for 30 years, 6 years assumed as a young child and 24 years assumed as an adult. For cancer effects, the 30-year exposure to surface water and sediment represented by both the young child and adult are combined. This approach is more conservative than evaluating an adolescent and is also consistent with BHHRAs performed for PBOW sites in the past.

With respect to groundwater exposure, it is assumed that a hypothetical future adult resident ingests 2 L/day of tap water (EPA, 1991a) and that the young child drinks 1 L/day (EPA, 2012c). The total body surface areas of the adult and of the young child resident are assumed to be exposed to tap water while bathing/showering. The total surface area for an adult is assumed to be 20,000 cm^2 and the total surface area for the young child is assumed to be 6,600 cm^2 (EPA, 1997a). Both the child and adult resident are assumed to be dermally exposed to COPCs in groundwater while bathing/showering. The child is assumed to bathe for 20 minutes per day (0.33 hour/day), and the adult is assumed to shower for 12 minutes per day (0.2 hour/day) (EPA, 1997a). Inhalation rates of 0.833 m^3/hr for the adult (EPA, 1991a) and 0.416 m^3/hr for the child (EPA, 2004d) are used. Because EPA (1997a) lists a 90th percentile for time spent in a residence as over 23 hours per day, it is conservatively assumed that the resident spends 24 hours per day in the house.

3.1.3.6 Future Hunter

This scenario is created to evaluate the potential for contaminants in soil to affect food chain pathways. AP3 provides habitat for deer and other wildlife. Even though hunting is not currently permitted at AP3, deer hunting is permitted in other areas within PBOW; therefore, future use of AP3 for hunting is evaluated in this BHHRA.

Many kinds of game animals may be hunted and consumed (e.g., squirrel, pheasant and other upland birds, turkey, or deer); however, the deer is the species most likely to contribute meaningfully to the diet. Therefore, this evaluation is limited to a deer hunter. Potential exposure pathways include incidental surface soil ingestion, dermal contact with surface soil, and ingestion of venison from deer that browse plants growing on contaminated surface soil, all of which are evaluated quantitatively. Inhalation of airborne dust from wind currents is a potentially complete exposure pathway; however, vegetation reduces dust emissions to insignificant levels (EPA, 1996), and it is assumed that the deer hunter would spend virtually all of his time on vegetated rather than bare soil. Therefore, it is assumed that inhalation exposure would contribute much less than incidental ingestion, and the inhalation exposure pathway is not quantified separately from ingestion.

Inhalation exposure to airborne VOCs from subsurface soil and surface water is not evaluated for the reasons previously explained for other receptors. Also, ingestion and dermal exposure to surface water and sediment are expected to be negligible for this receptor, as contact with these media would generally be avoided during hunting activities.

The deer hunter is assumed to be a 70-kg adult who harvests deer and consumes venison over a 30-year period. It is assumed that he spends 14 days per year hunting on PBOW. His incidental soil ingestion rate is assumed to be 100 mg/day (EPA, 1991a). Hunting at PBOW occurs in the fall and winter. Given the temperate climate of northern Ohio during hunting season, a hunter would dress appropriately, with typically only the hands and head exposed, at most. The default industrial RME exposed skin surface area of 3,300 cm^2, which represents the hands, forearms, and head (EPA, 2004a), is conservatively assumed for the hunter. The default industrial RME soil AF of 0.2 mg/cm^2 (EPA, 2004a) is also assumed.

Data regarding the rate of venison ingestion were not located; therefore, a hypothetical scenario is adapted from the assumptions applied to a similar site in West Virginia (IT, 2000) and subsequently applied to TNTA and TNTC (IT, 2001a). A highly conservative but plausible scenario consists of a hunter who kills one deer from the AP3 property each year. It is assumed that the hunter eats 10 pounds (4.5 kg) of venison per year (Sharp, 1995). This consumption rate

corresponds to 0.013 kilograms per day (kg/day) (0.186 grams per kilogram of body weight per day [g/kg-day]) of venison for each of the 350 days per year (EPA, 1991a) that the hunter spends at his residence.

3.1.3.7 Future Hunter's Child

It is likely that a successful hunter, described in Section 3.1.3.6, would share his venison with the rest of the family, which may include small children. Small children, however, would be unlikely to accompany the hunter afield. Therefore, the direct exposure pathways evaluated for the hunter (i.e., incidental ingestion and dermal contact with soil) are not evaluated for the small child.

Data regarding the rate of venison ingestion by small children were not located. However, if it is assumed that venison may replace beef in the diet, the differences in beef consumption between adults and children can be used to estimate a venison ingestion rate for children. EPA (1997a) provides per capita beef intake data for <1- to 5-year-old children ranging from 0.941 to 1.46 g/kg-day (time-weighted average of 1.296 g/kg-day). EPA (1997a) provides per capita beef intake data for 12- to 70-plus-year-old adults ranging from 0.568 to 0.83 g/kg-day (time-weighted average of 0.727 g/kg-day). From these data, it can be estimated that the rate of beef consumption for small children, expressed on a body weight basis, is approximately 1.8 times that of an adult. Therefore, a venison ingestion rate of 0.335 g/kg-day is estimated for a young child from the venison ingestion rate of 0.186 g/kg-day for the adult. Assuming that the child is 1 through 6 years old with an average body weight of 15 kg (EPA, 1991a; 2002), the child's venison ingestion rate may be expressed as 0.005 kg/day.

3.1.3.8 Other Receptors Not Considered

Another plausible receptor group is delivery personnel. These receptors, however, would be less intensively exposed to soil than the groundskeeper; therefore, their exposures are not evaluated. AP3 could become part of the area used for National Guard training activities. National Guard trainees, however, may be less exposed to any of the potentially contaminated media than the receptors identified previously. Because they would likely not represent an upper bound for nonresidential exposure, these receptors are not evaluated. The unnamed tributary to Plum Brook is too small to support game fish, as is the AP3 drainage ditch. Therefore, fish ingestion as an indirect pathway for exposure to surface water and sediment is not evaluated. Also, as discussed in Section 3.1, off-site use of groundwater is not evaluated because nearby residents use municipal water from surface water sources as a potable source, and potential on-site users would be exposed to higher concentrations of contaminants in groundwater.

3.2 Quantification of Exposure-Point Concentrations

The EPC is an estimate of the concentration of a COPC in a given medium to which a receptor may be exposed over the duration of the exposure. An EPC may be based on chemical concentrations in media that have been directly measured using laboratory analysis, or it may be derived based on environmental medium-to-medium transport modeling. The EPCs of COPCs in soil, groundwater, surface water, and sediment are derived based on measured analytical data. Note that the EPC for dermal exposure to VOCs in groundwater is based on one-half the EPC derived from the measured concentrations in groundwater (Sections 3.2.1 and 3.2.2.3). This value is used because it is assumed that 50 percent of the groundwater VOC concentration is volatilized during normal household use (Section 3.2.2.2). Concentrations of COPCs in air and venison are not measured (and in some cases cannot reasonably be measured) but are based on models that use the EPCs of COPCs in the appropriate directly measured media (i.e., soil and groundwater) as input values.

Section 3.2.1 describes the approaches used to derive EPCs for direct exposure to soil, groundwater, surface water, and sediment based on analytical measurements from samples of these media. Models to derive EPCs for the air are described in Sections 3.2.2.1 and 3.2.2.2, and the model used to derive venison EPCs is described in Section 3.2.2.4.

3.2.1 Soil, Groundwater, Surface Water, and Sediment Concentrations

Exposure to an environmental medium is generally assumed to be random, and the EPC should be the arithmetic average encountered over the duration of exposure (EPA, 1989a). Therefore, the population mean concentration, if known, would be the ideal value selected as the EPC. The sample mean is an obvious estimate of the population mean. However, uncertainties exist as to how well the sample mean represents the population mean. Therefore, EPA (1989a) has recommended the inclusion of a UCL for RME evaluation as a conservative estimate of the true mean exposure concentration.

The EPA (2010a,b; 2011) ProUCL (Version 4.1) software was used to estimate UCLs for the data sets of all environmental media represented by at least five samples. If the data set consists of fewer than five data points, the MDC was selected as the EPC. Analytical data from field duplicates are averaged with originals to yield one result for use in the statistical manipulations (Section 2.5). One-half the reporting limit is used as the ProUCL input concentration for nondetects as a conservative estimate of the method detection limit, because method detection limits are not available for the historical data (USACE, 1999). Nondetect sample results with aberrantly high detection limits due to matrix interferences, or other sample-specific causes, are included in the initial ProUCL calculations. This is a conservative approach, as EPA (1989a)

recommends that nondetect results with aberrantly high detection limits be removed from the data set so that calculation of the UCL is not unduly skewed by a nondetect. Because the latest version of ProUCL (EPA, 2011) includes mathematical manipulations under the default "with NDs" mode that are more robust than previous versions, single elevated detection limits are less likely to skew the UCL estimates than in the past. If it is observed during the risk characterization that an elevated nondetect value skews a UCL estimate such that this value substantially affects the result of the risk estimate, the ProUCL model is rerun without the elevated nondetect value and the risks are recalculated. If this recalculation is performed on a data set, data eliminated for the recalculation are identified in the risk characterization and discussed in the uncertainty analysis. The re-evaluation of elevated nondetects was not performed in the AP3 BHHRA.

ProUCL generates a variety of UCL estimates for each data set. The ProUCL output for each COPC is included in Appendix B. Generally, the results of one or two (sometimes more) of the UCL estimates are recommended. This recommendation is based on a variety of factors, including the distribution (e.g., normal, lognormal, gamma, or not discernable) that provides the best fit, number of nondetects, size of the data set, and skewness. If the recommended value(s) under the default mode equals or exceeds the MDC, ProUCL is rerun using the full data set mode, under the assumption that the COPC is present in nondetects at one-half the reporting limit. Occasionally, ProUCL recommends the 97.5 or 99 percent upper confidence limit on the arithmetic mean estimated by the Chebyshev method. In these cases, the UCL estimated by the Chebyshev method (95th percent) is selected as the EPC because this is more consistent with the intent of the RME paradigm as defined by EPA (1989a; 1991a).

The UCL generated by the ProUCL protocol described in the preceding paragraphs or the MDC, whichever is smaller, is selected as the EPC and is understood to represent a conservative estimate of average for use in the risk assessment or in various transport models used to estimate EPCs. Note that EPA (1989a) guidance states that an estimate of average rather than the MDC should be used to represent the EPC under chronic exposure and that use of the maximum is typically not reasonable. Therefore, data sets which use the MDC as the EPC are generally biased high. Unusually high detected values are included in the calculation of the UCL concentration. Inclusion of these high values increases the statistical variability and the overall conservativeness of the risk estimate.

ProUCL is a software tool that provides estimates of the UCL using a variety of mathematical approaches. As mentioned, its output includes one or more recommendations. Depending on the data set, some of the estimates generated by the various calculation methods included in ProUCL

may vary by an order of magnitude. ProUCL and the decision tree on which its recommendations are based have been developed using multitudes of simulated data sets with a variety of distributions and other characteristics. There are uncertainties as to how well this decision tree derives a recommended UCL for a given data set. This uncertainty tends to increase with variability and skewness and where a large number of the samples are nondetects. For example, with respect to distribution testing, ProUCL bases the determination of distribution type only on the detected samples. The true concentrations of the nondetected values are unknown, and this lack of information can affect the distribution determination and consequently affect the ProUCL recommendation. The general uncertainties associated with the EPC values and the use of ProUCL are discussed in the uncertainty analysis (Chapter 6.0). Specific uncertainties associated with the EPC values of specific data sets may be discussed in the uncertainty analysis as appropriate.

3.2.2 Exposure-Point Concentrations in Air

The models shown in the following sections for estimating COPC concentrations in air include only those relevant and used specifically for AP3 COPCs and media.

3.2.2.1 COPC Concentrations from Dust

Inhalation exposure to particulate (dust) emissions from soils for the groundskeeper and construction worker evaluations arises from activities that raise dust. Therefore, the most appropriate approach for estimating chemical concentrations in ambient air is the use an activity-based dust loading equation (U.S. Department of Energy [DOE], 1989):

Eq. 3.1

$$C_a = (D)(C_s)(CF_1)$$

where:

C_a = contaminant concentration in air (milligrams per cubic meter [mg/m^3], calculated)
D = dust loading factor (grams [g] of soil/m^3 of air)
C_s = contaminant concentration in soil (mg/kg)
CF_1 = conversion factor (1E-3 kg per g).

Plausible values for D include 2E-4 grams per cubic meter (g/m^3) for agricultural activity (DOE, 1989), 6E-4 g/m^3 for construction work (DOE, 1983), and 1E-4 g/m^3 for other activity (National Council on Radiation Protection and Measurements, 1984). The value for D of 1E-4 g/m^3 for other activity is used for the groundskeeper. It is assumed that construction activities requiring intensive contact with soil, for which D = 6E-4 g/m^3 is appropriate, may last for one-half of a construction period. The remaining one-half of the time is more realistically characterized by

D = 1E-4 g/m^3. Therefore, a time-weighted average dust loading factor for construction work of 3.5E-4 g/m^3 is estimated for the construction worker.

Airborne concentrations of VOCs estimated by the dust loading model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust loading model treats the VOCs as if they were located at the ground surface.

The resident is more likely to be exposed to dust arising from wind erosion than from dust-raising activities on the site. EPA (1996) derived a model for estimating a dust particulate emission factor (PEF) based on an "unlimited reservoir" model and the assumption that the source area is square:

Eq. 3.2

$$PEF = Q/C \times \frac{3600}{0.036 \times (1 - V) \times (U_m / U_t)^3 \times F(x)}$$

where:

PEF	=	particulate emission factor (cubic meters per kilogram [m^3/kg], calculated)
Q/C	=	inverse of the mean concentration at center of square source (55.99 grams per square meter-second per kg/m^3, site-specific value from Table 3 in EPA [1996] [Zone 7, Cleveland, 5-acre site])
3600	=	seconds/hour
V	=	fraction of surface covered with vegetation (0.8, unitless, assumed)
U_m	=	mean annual wind speed (default, 4.60 meters per second [m/second] equals mean annual wind speed of 10.3 miles per hour [Section 3.1.1])
U_t	=	equivalent threshold value of wind speed at 7 meters (default, 11.32 m/second)
F(x)	=	function dependent on U_m/U_t (default, 0.194).

The concentration of a COPC in air is calculated as follows:

Eq. 3.3

$$C_a = \frac{C_s}{PEF}$$

where:

C_a	=	contaminant concentration in air (mg/m^3, calculated)
C_s	=	contaminant concentration in soil (mg/kg)
PEF	=	particulate emission factor (m^3/kg).

Airborne concentrations of VOCs estimated by the wind erosion model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the wind erosion model treats the VOCs as if they were located at the ground surface.

3.2.2.2 Concentrations in Household Air from Groundwater Use

The inhalation of VOCs released from groundwater, which is assumed to be used as tap water, is evaluated for the on-site residential scenario. Chemicals that have a Henry's Law value exceeding 1E-5 atmospheres/m^3-mole and a molecular weight less than 200 g/mole are considered to be VOCs and are subject to evaluation via this pathway; Henry's Law values and molecular weights are presented in Table 3-3. Other groundwater contaminants are considered on a case-by-case basis for their potential contribution to risk via the inhalation pathway based on the degree of departure from the Henry's Law and molecular weight criteria, groundwater concentration, and toxicity.

The simple whole-house tap water-to-air model described in Part B of the EPA (1991b) Human Health Evaluation Manual (HHEM) was used to evaluate the tap water-to-air pathway. This model was selected based on correspondence between OEPA (2004) and USACE. Part B of the HHEM recommends a volatilization constant of 0.0005 for the total concentrations of all VOCs detected in groundwater; the conversion is characterized by the following equation:

Eq. 3.4

$$C_a = C_{gw} \times K_{wa} \times 1{,}000 \, {}^{L}\!/_{m^3}$$

where:

C_a = modeled concentration in air (mg/m^3)
C_{gw} = groundwater EPC (mg/L)
K_{wa} = tap water-to-air volatilization constant (0.0005 [unitless] [EPA, 1991b])

Implicit in the HHEM Part B application of this model are the following assumptions: 1) A family of four uses the groundwater as the sole source of household tap water, 2) the volume of the house is 150 m^3, 3) the daily groundwater use is 720 L/day, 4) 50 percent of VOCs in tap water volatilize to household air, and 5) the air exchange rate of the house is 0.25 volumes per hour (EPA, 1991b).

3.2.2.3 Concentrations of VOCs in Groundwater: Resident Dermal Uptake

Volatilization of VOCs from household water reduces the remaining concentration available for dermal contact. As mentioned in Section 3.2.2.2, the HHEM Part B whole-house tap water-to-air model assumes that 50 percent of the VOC concentrations are released to household air. Thus, the concentrations of VOCs remaining in the water after volatilization occurs are calculated by difference as follows:

Eq. 3.5

$$C_d = C_{gw} \times (1 - F_v)$$

where:

C_d = concentration of VOC in household water available for dermal exposure (mg/L, calculated)
C_{gw} = concentration of VOC in groundwater (mg/L)
F_v = fraction of VOCs volatilized to air, (0.5 unitless).

Only the concentration remaining in tap water after volatilization (C_d), as applicable, is assumed to be available for contact with the skin during bathing/showering.

3.2.2.4 Exposure-Point Concentrations of COPCs in Venison

The hunter is assumed to harvest and consume game and share it with family members, including small children. The game is assumed to be venison, because the white-tailed deer is the species hunted most widely and most likely to provide a regular contribution to the diet. Data do not exist to reliably estimate contaminant concentrations in venison, but the following simplifying assumptions permit estimates sufficient for a BHHRA.

- Deer are small ruminants and, as such, are not unlike cattle; thus, it is reasonable to assume they may have similar physiological processes that could yield similar biotransfer factors. Unlike beef, however, deer meat does not undergo marbling with fat, and deer fat is quite unpalatable and is likely to be trimmed rather than consumed. Therefore, the biotransfer factors for edible venison are derived by adjusting biotransfer factors for beef to account for differences in the fat content of table-ready beef (cooked choice retail cuts trimmed to 0 inches of fat: average 14.4 percent fat) and venison (cooked boneless muscle meats: average 2.9 percent fat) (Nutrient Database, 1997).

- Deer are expected to browse a much larger area than that encompassed in AP3; therefore, the fraction of total browse consumed from AP3 is expected to be relatively small.

- Indirect food chain pathways may be significant for some metals and for those semivolatile organic compounds that persist in the environment and have the tendency to bioaccumulate. VOCs are generally mobile in the environment and labile in biological systems and do not tend to bioaccumulate.

To reflect the assumptions previously noted, venison biotransfer factors are estimated by multiplying beef biotransfer factors by 2.9/14.4 (or 0.20), and by a fraction, FI_r. This fraction reflects the areal portion of the site compared to a deer's home range area. These assumptions are captured in the following equation:

Eq. 3.6

$$B_v = 0.20(B_b)(FI_r)$$

where:

B_v	=	biotransfer factor for venison (unitless, calculated)
0.20	=	factor to reflect differences in fat content between beef and venison (0.20, unitless, see above)
FI_r	=	areal portion of site compared to a deer's home range (0.03, unitless, see below)
B_b	=	biotransfer factor for beef.

Values for B_b for metals are provided in the toxicity profiles (Appendix C). Toxicity profiles are prepared for each of the COPCs. The toxicity profiles briefly describe the uses of the chemical, its physical properties, behavior in environmental media, biotransfer capability, and toxicity values.

The AP3 area is relatively small in comparison to the home range of a white-tailed deer. The total acreage of the AP3 study area is about 1.5 acres. The home range of the white-tailed deer is between 150 and 1,280 acres (Sample and Suter, 1994). Even if the low end of this range (150 acres) is assumed for deer in northern Ohio, the area represented by AP3 is approximately 1 percent of this land area. Although the use of FI_r equal to 0.01 or lower is justified, an FI_r value of 0.03 is used in the BHHRA to be consistent with other small sites evaluated at PBOW.

Deer are assumed to be exposed to contaminants by ingesting browse growing on contaminated soil. It is estimated that deer consume approximately 1.74 kg of browse per day (Sample et al., 1996), which is approximately 50 percent dry matter (DM), or 0.87 kg browse DM per day (Mautz et al., 1976). The contaminant concentration in browse is estimated from the following equation, which was originally developed for estimating the contaminant concentration in forage to which cattle may be exposed (EPA, 1994):

Eq. 3.7

$$C_p = (CF)(C_s)(B_p)$$

where:

C_p	=	concentration of contaminant in (plant) forage DM (mg/kg, calculated)
CF	=	conversion factor to adjust for soil containing 20 percent moisture (1.25, unitless).
C_s	=	concentration of contaminant in soil (mg/kg)
B_p	=	soil-to-forage biotransfer factor (mg of chemical per kg of dry plant/mg of chemical per kg of dry soil).

Values for B_p are taken from the toxicity profiles in Appendix C. B_p values for the vegetative parts of plants, rather than the reproductive parts of plants, are selected, as possible, because deer browse year-round, and the vegetative parts are more available for the greater part of the year.

The concentration of a COPC in venison can be estimated from the following equation (adapted from EPA [1994]):

Eq. 3.8

$$C_v = (Q_p)(C_p)(B_v)$$

where:

C_v	=	contaminant concentration in venison (mg/kg, calculated)
Q_p	=	browse ingestion rate (0.87 kg DM/day)
C_p	=	contaminant concentration in browse DM (mg/kg)
B_v	=	biotransfer factor for venison (days/kg).

3.3 Quantification of Chemical Intake

This section describes the models used to quantify doses or intakes of the COPCs by the exposure pathways identified above. Models were taken or modified from EPA (1989a) unless otherwise indicated.

3.3.1 Inhalation of COPCs in Air

The inhaled dose of a COPC in air (for the groundskeeper, construction worker, and future on-site resident: inhalation of dust and VOCs in ambient air from surface or total soil; for the construction worker: inhalation of VOCs in ambient air from subsurface soil; for the future indoor worker and future on-site resident: inhalation of VOCs in indoor air from subsurface soil) is estimated as follows:

Eq. 3.9

$$I_a = \frac{(C_a)(FI_a)(IR_a)(EF)(ED)}{(BW)(AT)}$$

where:

I_a	=	inhaled dose of COPC (milligrams per kilograms per day [mg/kg-day], calculated)
C_a	=	concentration of COPC in air (mg/m^3)
FI_a	=	fraction of exposure attributed to site media (unitless)
IR_a	=	inhalation rate (m^3/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

3.3.2 Incidental Ingestion of COPCs in Soil or Sediment

The ingested dose of a COPC in soil (groundskeeper, construction worker, future resident, future indoor worker, hunter) or sediment (construction worker, future resident) is estimated from the following equation:

Eq. 3.10

$$I = \frac{(C)(FI)(IR)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

I	=	I_s for soil, I_{sd} for sediment = ingested dose of COPC (mg/kg-day, calculated)
C	=	C_s for soil; C_{sd} for sediment = concentration of COPC (mg/kg)
FI	=	FI_s for soil; FI_{sd} for sediment = fraction of exposure attributed to site medium (unitless)
IR	=	IR_s for soil; IR_{sd} for sediment = ingestion rate of medium (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
CF	=	conversion factor (1E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days).

3.3.3 Incidental Ingestion of COPCs in Water

The ingested dose of a COPC in groundwater (future groundskeeper, future resident) is estimated from the following equation:

$$I_w = \frac{(C_w)(IR_w)(FI_w)(EF_w)(ED_w)}{(BW)(AT)}$$ Eq. 3.11

where:

I_w	=	ingested dose of COPC in water (mg/kg-day, calculated)
C_w	=	concentration of COPC in water (mg/L)
IR_w	=	water ingestion rate (L/day)
FI_w	=	fraction of exposure attributed to site water (unitless)
EF_w	=	fraction of exposure attributed to site water exposure frequency (days/year)
ED_w	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

3.3.4 Dermal Contact with COPCs in Soil, Sediment, or Water

Unlike the methodologies for estimating inhaled or ingested doses of a COPC, which quantify the dose presented to the barrier membrane (the pulmonary or gastrointestinal mucosa, respectively), dermal dose is estimated as the dose that crosses the skin and is systemically absorbed. For this reason, dermal toxicity values are also based on absorbed dose. The absorbed dose of a COPC is estimated from the following equation (EPA, 2004a):

Eq. 3.12

$$DAD = \frac{(DA)(SA)(EF)(ED)}{(BW)(AT)}$$

where:

DAD = average dermally absorbed dose of COPC (mg/kg-day, calculated)
DA = dose absorbed per unit body surface area per day (milligrams per square centimeter per day [mg/cm^2-day])
SA = SA_s for soil, SA_{sd} for sediment, S_{gw} for groundwater, SA_{sw} for surface water, = surface area of the skin exposed (cm^2)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days).

Dose absorbed per unit body surface area per day (DA) is calculated differently for dermal uptake from soil/sediment and from water. Dermal uptake of constituents from soil (groundskeeper, construction worker, future on-site resident, hunter) or sediment (construction worker, future on-site resident) assumes that absorption is a function of the fraction of a dermally applied dose that is absorbed. DA is calculated from the following equation (EPA, 2004a):

Eq. 3.13

$$DA = (C_s)(FI_s)(CF)(AF)(ABS)$$

where:

DA = dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C = C_s for soil, C_{sd} for sediment = concentration of COPC in medium (mg/kg)
FI = FI_s for soil, FI_{sd} for sediment = fraction of exposure attributed to site medium (unitless)
CF = conversion factor (1E-6 kg/mg)
AF = AF_s for soil, AF_{sd} for sediment = soil- or sediment-to-skin adherence factor (mg/cm^2-day)
ABS = absorption fraction (unitless, chemical-specific).

ABS values are provided in the toxicity profiles for each COPC (Appendix C).

Quantification of dermal uptake of constituents from groundwater (future groundskeeper, future resident) or surface water (construction worker, future resident) depends on a K_p, which describes the rate of movement of a constituent from water across the dermal barrier to the systemic circulation (EPA, 2004a). The equation for dermal uptake of chemicals from water is the same as the equation for dermal uptake of chemicals from soil (Eq. 3.12). DA is calculated differently for inorganic and organic chemicals in water. For inorganic chemicals, DA is calculated from the following equation:

Eq. 3.14

$$DA = (C_w)(FI)(K_p)(ET_w)(CF)$$

where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w	=	concentration of COPC in water (mg/L)
K_p	=	permeability coefficient (centimeters per hour [cm/hour])
ET_w	=	time of exposure (hours/day)
CF	=	conversion factor (1E-3 liters per cubic centimeter [L/cm^3]).

K_p for organic chemicals varies by several orders of magnitude and is highly dependent on lipophilicity, expressed as a function of the octanol/water partition coefficient (EPA, 2004a). Because the stratum corneum (the outer skin layer) is rich in lipid content, it may act as a sink, initially reducing the transport of chemical to the systemic circulation. With continued exposure and the attainment of steady-state conditions, the rate of dermal uptake increases. Therefore, different equations are used to estimate DA, depending on whether the ET is less than or greater than the estimated time to reach steady state. Non-steady-state exposures occur when either the ET is relatively brief (e.g., showering, for most chemicals) or when intermittent exposure occurs throughout the day (e.g., wading exposure to surface water or washing of hands). For exposure scenarios under which steady state is not reached for a given organic chemical (τ> ET, see below), the following equation is used to calculate DA (EPA, 2004a):

Eq. 3.15

$$DA = 2(FA)(K_p)(C_w)(CF)\sqrt{\left(\frac{6\tau(ET_w)}{\pi}\right)}$$

where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w	=	C_{sw} for surface water, C_{gw} for groundwater = concentration of COPC in water (mg/L)
FA	=	fraction absorbed from the water (unitless)
K_p	=	permeability coefficient (cm/hour)
CF	=	conversion factor (1E-3 L/cm^3)

τ = time for concentration of contaminant in stratum corneum to reach steady state per event (hours)
ET_w = time of contact (hour(s)/day).

In cases where steady state is reached (τ<ET), such as where the duration of a bath exceeds the time to reach steady state for a given organic compound, the following equation is used to calculate DA (EPA, 2004a):

Eq. 3.16

$$DA = (FA)(K_p)(C_w)(CF)\left[\frac{ET_w}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

where:

DA = dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_w = concentration of COPC in water (mg/L)
FA = fraction absorbed from the water (unitless)
K_p = permeability coefficient (cm/hour)
CF = conversion factor (1E-3 L/cm^3)
τ = time for concentration of contaminant in stratum corneum to reach steady state per event (hours)
ET_w = time of contact (hour[s]/day)
B = Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (unitless).

Assuming one exposure event/day allows expressing ET as hour(s)/day, which preserves the dimensional integrity of the equation.

When available, values for K_p and τ are taken from EPA (2004a). For organics that have no K_p values listed, the values are calculated using the following equation (EPA, 2004a):

Eq. 3.17

$$\text{Log}(K_p) = -2.80 + 0.66(\log K_{ow}) - 0.0056(MW)$$

where:

K_p = permeability coefficient (cm/hour, calculated)
log K_{ow} = log of the octanol/water partition coefficient (unitless)
MW = molecular weight.

Where values for τ are not available, they were calculated using the following equation (EPA, 2004a).

Eq. 3.18

$$\tau = 0.105 \times 10^{(0.0056 \times MW)}$$

where:

τ	=	time for concentration of contaminant in stratum corneum to reach steady state (hours, calculated)
MW	=	molecular weight.

Values of K_p and τ used in the BHHRA are summarized in Table 3-3 and documented in Appendix C.

3.3.5 Consumption of Venison

Consumption of venison by the hunter or the hunter's child is evaluated by the following equation:

Eq. 3.19

$$I_v = \frac{(C_v)(IR_v)(EF)(ED)}{(BW)(AT)}$$

where:

I_v	=	ingested dose of COPC in venison (mg/kg-day, calculated)
Cv	=	concentration of COPC in venison (mg/kg)
IRv	=	venison ingestion rate (kg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

4.0 Toxicity Evaluation

Toxicity is defined as the ability of a chemical to induce adverse effects in biological systems. The purpose of the toxicity assessment is two-fold:

- Identify the cancer and noncancer effects that may arise from exposure of humans to the COPC (hazard assessment).
- Provide an estimate of the quantitative relationship between the magnitude and duration of exposure and the probability or severity of adverse effects (dose-response assessment).

The latter is accomplished by the derivation of cancer and noncancer toxicity values, as described in the following sections.

4.1 Evaluation of Carcinogenicity

A few chemicals are known, and many more are suspected, to be human carcinogens. The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect (EPA, 2005). The qualitative aspect is a weight-of-evidence evaluation of the likelihood that a chemical might induce cancer in humans. EPA (2005) recognizes five weight-of-evidence group classifications for carcinogenicity. Formerly, EPA (1986) used a letter-based system to describe the weight of evidence for carcinogenicity. Reference to this former system is included because many of the carcinogenicity assessments listed on the Integrated Risk Information System (IRIS) use the former letter-based system (EPA, 2013). The five EPA weight-of-evidence classifications are as follows:

- ***Carcinogenic to Humans*** (corresponds to the former Group A – Human Carcinogen).
- ***Likely to be Carcinogenic to Humans*** (includes both the former Group B1 and Group B2 – Probable Human Carcinogens)
- ***Suggestive Evidence of Carcinogenic Potential*** (corresponds to the former Group C – Possible Human Carcinogen)
- ***Inadequate Information to Assess Carcinogenic Potential*** (corresponds to the former Group D – Not Classifiable as to Human Carcinogenicity)
- ***Not Likely to be Carcinogenic to Humans*** (corresponds to the former Group E – Evidence of Noncarcinogenicity to Humans).

The toxicity value for carcinogenicity, called a cancer slope factor (SF), is an estimate of potency. SFs are developed only for chemicals in the first three groups and only if the data are sufficient. The SFs are statistically derived from the dose-response curve from the best human or animal study or studies of the chemical. Human data are often considered to be more reliable than animal data because there is no need to extrapolate the results obtained in one species to another. Because human studies typically have limitations (e.g., uncertainties regarding exposure concentrations, durations, lack of experimental control, small sample sizes, and representativeness of the exposed population), most SFs are derived from animal data. Uncertainties associated with animal studies are further mentioned in the uncertainties analysis.

The SF is expressed as risk per mg/kg-day, shown mathematically as $(mg/kg\text{-}day)^{-1}$. To be appropriately conservative, the SF is usually the 95 percent upper bound on the slope of the dose-response curve extrapolated from high (experimental) doses to the low-dose range expected in environmental exposure scenarios. EPA (2005) assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk, however miniscule it may be.

The oral SF is usually derived directly from the experimental dose data, because oral dose is usually expressed as mg/kg-day. When the test chemical was administered in the diet or drinking water, oral dose first must be estimated from data for the concentration of the test chemical in the food or water, food or water intake data, and body weight data.

IRIS (EPA, 2013) expresses inhalation cancer potency as a unit risk based on concentration, or risk per microgram of chemical per m^3 of ambient air, shown mathematically as (micrograms per cubic meter $[\mu g/m^3])^{-1}$. Because cancer risk characterization requires an SF expressed as risk per mg/kg-day, the unit risk must be converted to the mathematical equivalent of an inhalation cancer SF, or risk per unit dose as $(mg/kg\text{-}day)^{-1}$. Because the inhalation unit risk is based on continuous lifetime exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the unit risk (per $\mu g/m^3$) by 70 kg and by 1,000 micrograms per milligram, and dividing the result by 20 m^3 per day.

4.2 Evaluation of Noncarcinogenic Effects

Many chemicals, whether or not associated with carcinogenicity, are associated with adverse noncarcinogenic effects. The evaluation of noncancer effects (EPA, 1989b) involves the following:

- Qualitative identification of the adverse effect(s) associated with the chemical; these may differ depending on the duration (acute or chronic) or route (oral or inhalation) of exposure.

- Identification of the critical effect for each duration of exposure (i.e., the first adverse effect that occurs as dose is increased).

- Estimation of the threshold dose for the critical effect for each duration of exposure.

- Development of an uncertainty factor (UF); i.e., quantification of the uncertainty associated with interspecies extrapolation, intraspecies variation in sensitivity, severity of the critical effect, slope of the dose-response curve, and deficiencies in the database, in regard to developing a reference dose (RfD) for human exposure.

- Identification of the target organ(s) for the critical effect for each route of exposure.

These information points are used to derive an exposure route- and duration-specific toxicity value called an RfD, expressed as mg/kg-day, which is considered to be the dose for humans, with uncertainty of an order of magnitude or greater, at which adverse effects are not expected to occur. Mathematically, it is estimated as the ratio of the threshold dose to the UF. For purposes of risk assessment, chronic exposure is typically defined as equal to or greater than 7 years, i.e., at least 10 percent of expected life span; subchronic exposure is typically defined as 2 weeks to 7 years. However, professional judgment may be used where exposure durations approach 10 percent of the expected life span. Also, exposure during a critical stage of development, such as a portion of early childhood, may be treated as chronic even if the anticipated exposure duration is considerably less than 10 percent of the expected life span.

IRIS (EPA, 2013) expresses the inhalation noncancer reference value as a reference concentration (RfC) in units of mg/m^3. Because the noncancer hazard characterization described in the work plan (Shaw, 2009) requires a reference value expressed as mg/kg-day, the RfC is converted to an inhalation RfD. Because the inhalation RfC is based on continuous exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the RfC (mg/m^3) by 20 m^3/day and dividing the result by 70 kg.

RfD and RfC values are derived for both chronic and subchronic exposure. Under the assumption of monotonicity (incidence, intensity, or severity of effects can increase, but cannot decrease, with increasing magnitude or duration of exposure), a chronic RfD may be considered sufficiently protective for subchronic exposure, but a subchronic RfD may not be protective for

chronic exposure. Currently, subchronic RfD values exist for few chemicals. Subchronic RfD values can be derived from chronic RfD values as follows:

- If the UF applied in the derivation of the chronic RfD (or RfC) does not provide for expansion from subchronic to chronic exposure (e.g., if the chronic RfD was derived from a chronic study), the chronic RfD is adopted as being sufficiently protective for subchronic exposure.

- If the UF applied in the derivation of the chronic RfD (or RfC) contains a component to expand from subchronic to chronic exposure, the subchronic RfD is derived by multiplying the chronic RfD by the factor used to expand from subchronic to chronic exposure (e.g., if a factor of 10 was used to expand from subchronic to chronic exposure, the subchronic RfD would be 10 times larger than the chronic RfD).

Only chronic RfDs and RfCs are used in the risk characterization of this BHHRA.

4.3 Dermal Toxicity Values

Dermal RfDs and SFs are derived from the corresponding oral values, provided there is no evidence to suggest that dermal exposure induces exposure route-specific effects that are not appropriately modeled by oral exposure data. In the derivation of a dermal RfD, the oral RfD is multiplied by the gastrointestinal absorption factor (GAF), expressed as a decimal fraction. The resulting dermal RfD, therefore, is based on absorbed dose. The RfD based on absorbed dose is the appropriate value with which to compare a dermal dose, because dermal doses are expressed as absorbed doses rather than exposure doses. The dermal SF is derived by dividing the oral SF by the GAF. The oral SF is divided, rather than multiplied, by the GAF because the SF is expressed as a reciprocal dose.

4.4 Target Organ Toxicity

As a matter of science policy, EPA assumes dose and effect to be additive for noncarcinogenic effects (EPA, 1989a). This assumption provides the justification for adding the HQ or hazard index (HI) values in the risk characterization for noncancer effects (Section 5.2) resulting from exposure to multiple chemicals, pathways, or media. However, EPA (1989a) acknowledges that adding all HQ or HI values may overestimate hazard, because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism.

Mechanisms of toxicity data sufficient for predicting additivity with a high level of confidence are available for very few chemicals. In the absence of such data, EPA (1989a) assumes that chemicals that act on the same target organ may do so by the same mechanism of toxicity; that is, the target organ serves as a surrogate for mechanism of toxicity. When total HI for all media

for a receptor exceeds 1 due to the contributions of several chemicals, it is appropriate to segregate the chemicals by route of exposure and mechanism of toxicity (i.e., target organ) and estimate separate HI values for each target organ.

As a practical matter, because human environmental exposures are likely to involve near- or sub-threshold doses, the target organ chosen for a given chemical is the one associated with the critical effect. If more than one organ is affected by a given chemical at the threshold, then all affected target organs are selected for this chemical. The target organ is also selected on the basis of duration of exposure (i.e., the target organ for chronic or subchronic exposure to low or moderate doses is selected rather than the target organ for acute exposure to high doses) and route of exposure. Because dermal RfD values are derived from oral RfD values, the oral target organ is adopted as the dermal target organ. For some chemicals, no target organ is identified. This occurs when no adverse effects are observed or when adverse effects such as reduced longevity or growth rate are not accompanied by recognized organ- or system-specific functional or morphologic alteration.

4.5 Sources of Toxicity Information Used in the Risk Assessment

Toxicity values were selected for use in the BHHRA based on EPA Office of Solid Waste and Emergency Response Directive 9285.7-53 (EPA, 2003), which prescribes the following hierarchy:

- **Tier 1** values: IRIS (EPA, 2013) database.
- **Tier 2** values: These are EPA's provisional peer-reviewed toxicity values. The provisional peer-reviewed toxicity values are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.
- **Tier 3** values: These are other toxicity values from additional EPA and non-EPA sources of toxicity information. As stated in the EPA Office of Solid Waste and Emergency Response directive, "priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed." Two common examples of Tier 3 values are the EPA's Health Effects Assessment Summary Tables (EPA, 1997b) and the California Environmental Protection Agency (2013) Office of Environmental Health Hazard Assessment Toxicity Criteria Database.

The Environmental Council of States-U.S. Department of Defense (2007) has issued a toxicity value hierarchy that basically supports the EPA (2003) hierarchy presented previously but places higher emphasis on the necessity for external peer review.

GAFs used to derive dermal RfD values and SFs from the corresponding oral toxicity values are obtained from the following sources, in order of hierarchy:

- Oral absorption efficiency data compiled by the National Center for Environmental Assessment for the Superfund Health Risk Technical Support Center of EPA, as listed in EPA (2004a).
- Federal agency reviews of the empirical data, such as Agency for Toxic Substances and Disease Registry toxicological profiles and various EPA criteria documents
- Other published reviews of the empirical data
- The primary literature.

GAFs obtained from reviews are compared to empirical (especially more recent) data, when possible, and evaluated for suitability for use in deriving dermal toxicity values from oral toxicity values. Some of the GAF values are also listed on the RSL table (EPA, 2012a). The suitability of the GAF increases when the following similarities are present in the oral pharmacokinetic study from which the GAF is derived and in the key toxicity study from which the oral toxicity value is derived:

- The same strain, sex, age, and species of test animal were used.
- The same chemical form (e.g., the same salt or complex of an inorganic element or organic compound) was used.
- The same mode of administration (e.g., diet, drinking water, or gavage vehicle) was used.
- Similar dose rates were used.

Individual COPC-specific toxicity profiles, including sources of the toxicity and GAF values, are included in Appendix C for all of the COPCs evaluated in the BHHRA. Summary toxicity information sufficient to support the risk calculations, including toxicity values, GAFs, and target organs are provided in Table 4-1.

5.0 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of site-specific contaminants. This is done by combining the intake rates estimated during the exposure assessment with the appropriate toxicity information identified during the toxicity assessment. Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects.

Quantitative expressions are calculated during risk characterization that describe the probability of developing cancer (i.e., ILCRs), or the nonprobabilistic comparison of estimated dose with an RfD for noncancer effects (i.e., HQs and HIs). Quantitative estimates are developed for individual chemicals, exposure pathways, and exposure media for each receptor. These quantitative risk characterization expressions, in combination with qualitative information, are used to guide risk management decisions. Risk characterization, as described in this section, is applied only to COPCs.

Generally, the risk characterization follows the methodology prescribed by EPA (1989a), as modified by more recent information and guidance. EPA methods are designed to be health protective and tend to overestimate rather than underestimate risk (EPA, 1989a; Burmaster and Harris, 1993; Cogliano, 1997). The risk results, however, may be overly conservative, because risk characterization involves multiplication of the conservative assumptions built into the estimation of the EPCs, exposure (intake) estimates, and toxicity dose-response assessments.

5.1 Cancer Risk

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime and is called the ILCR. In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (EPA, 1989a):

Eq. 5.1

$$ILCR = (CDI)(SF)$$

where:

ILCR = incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
CDI = chronic daily intake, averaged over 70 years (mg/kg-day)
SF = cancer slope factor (risk per mg/kg-day).

The chronic daily intake (CDI) term in Equation 5.1 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.9 through 3.12 and 3.19 when these equations are evaluated for cancer intakes.

The use of Equation 5.1 assumes that chemical carcinogenesis does not exhibit a threshold and that the dose-response relationship is linear in the low-dose range. Because this equation could generate theoretical cancer risks greater than 1 for high-dose levels, it is considered to be inaccurate at cancer risks greater than 1E-2. In these cases, cancer risk is estimated by the following one-hit model (EPA, 1989a):

Eq. 5.2

$$ILCR = 1 - e^{[-(CDI)(SF)]}$$

where:

ILCR = incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated

$-e^{(CDI)(SF)}$ = the exponential of the negative of the risk calculated using Equation 5.1.

Because all of the risks associated with AP3 COPCs are less than 1E-2, only Equation 5.1 was used in this BHHRA. As a matter of policy, EPA (1986) considers the carcinogenic potency of simultaneous exposure to low doses of carcinogenic chemicals to be additive, regardless of the chemicals' mechanisms of toxicity or sites of action (organs of the body). Cancer risk arising from exposure to multiple chemicals in a given exposure medium and pathway is estimated from the following equation (EPA, 1989a):

Eq. 5.3

$$ILCR_p = ILCR_{(chem\ 1)} + ILCR_{(chem\ 2)} + \cdots ILCR_{(chem\ i)}$$

where:

$ILCR_p$ = total pathway risk of cancer incidence, calculated

$ILCR_{(chem\ i)}$ = individual chemical cancer risk for the pathway.

The sum of the ILCRs summed across pathways is the total ILCR as shown in the following equation:

Eq. 5.4

$$Total\ ILCR = ILCR_{(p\ 1)} + ILCR_{(p\ 2)} + \cdots ILCR_{(p\ i)}$$

where:

Total ILCR = total incremental lifetime cancer risk across all pathways

$ILCR_{pi}$ = incremental lifetime cancer risks associate with pathway "*i*."

The total ILCR represents all additional cancer risks posed to a given receptor by contact with contaminants in site environmental media.

Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); as mentioned in Section 2.4.1, this range is referred to as the "NCP risk management range." Risks less than this range are regarded as negligible. A target cancer risk goal of 1E-5, the logarithmic midpoint of the NCP risk management range, was selected by the PBOW PDT as a basis to consider remedial action. This 1E-5 goal is also recognized by the State of Ohio as a goal for cancer risk (OEPA, 2009b). Use of this 1E-5 goal represents a departure from the Army's practice of using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations. Total ILCR values are rounded to one significant figure, consistent with EPA (1989a) guidance.

5.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with an RfD. The HQ, defined as the ratio of intake to RfD, is estimated as follows (EPA, 1989a):

Eq. 5.5

$$HQ = I \ / \ RfD$$

where:

HQ = hazard quotient (unitless, calculated)
I = intake of chemical averaged over subchronic or chronic exposure period (mg/kg-day)
RfD = reference dose (mg/kg-day).

The "I" term in Equation 5.5 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.9 through 3.12 and 3.19 when these equations are evaluated for noncancer intakes.

Chemical noncancer hazards are evaluated using chronic RfD values. This approach is different from the probabilistic approach used to evaluate cancer risks. An HQ of 0.01 does not imply a 1-in-100 chance of an adverse effect, but indicates only that the estimated intake is 100 times lower than the RfD. An HQ of unity indicates that the estimated intake equals the RfD. If the HQ is greater than unity, there may be concern for potential adverse health effects.

In the case of simultaneous exposure of a receptor to multiple chemicals, or to a given chemical by multiple pathways, an HI is calculated as the sum of the HQs by the following equation:

Eq. 5.6

$$HI = HQ_1 + HQ_2 + \ldots HQ_i$$

where:

HI = hazard index (unitless, calculated)
HQ_i = hazard quotient for the ith chemical, or for the ith pathway.

A total HI is calculated as the sum of all HI values, including all media and all COPCs, for a given receptor. Calculating a total HI as the sum of HQ values is based on the assumption that the potential for noncancer effects is additive. EPA (1989a), however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism (Section 4.4). Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ.

A total target organ HI is calculated by summing the HI values (associated by target organ[s]), across exposure pathways as follows:

Eq. 5.7

$$Total\ Target\ Organ\ HI_a = HI_{p1-a} + HI_{p2-a} + \ldots HI_{pi-a}$$

where:

Total target organ HI_a = total hazard index for target organ "*a*" (unitless, calculated)
HI_{pi-a} = hazard index for target organ "*a*" via pathway "*i*."

HI values of 1 or less indicate that adverse noncancer health effects associated with that target organ of any individual under the exposure assumptions for that receptor are unlikely. If the total target organ HI exceeds a value of 1, then adverse noncancer health effects concerning that target organ and receptor cannot be regarded as unlikely. Total HI values (including those specific to target organs) are rounded to one significant figure or to the nearest whole number if greater than 1, consistent with EPA (1989a) guidance.

5.3 Risk Characterization Results

Cancer and noncancer risk characterization results were evaluated for each receptor and each environmental medium, using the methods described in Sections 5.1 and 5.2. Sections 5.3.1 through 5.3.7 describe the risk characterization results for each receptor associated with AP3. Risk summary tables are shown for each receptor as referenced. The detailed quantitative evaluation tables that include the exposure equations presented in Chapter 3.0 and the risk characterization equations presented in Chapter 5.0 are provided in Appendix D. Analytical results used as input for the BHHRA are included as Appendix A.

5.3.1 Current Groundskeeper

The ILCR for the current groundskeeper (Table 5-1) exposed to surface soil both through direct contact and via inhalation of suspended particulates is estimated as 2E-5. This is within the 1E-6 to 1E-4 NCP risk management range but exceeds the PBOW cancer risk goal of 1E-5. Approximately 95 percent of this value is associated with arsenic in surface soil. Arsenic was identified as a COPC in surface soil because the concentration (44.1 mg/kg) at one location (AP3-SB08) slightly exceeded the BSC (36.5 mg/kg). Because the ILCR for this receptor exceeds the PBOW cancer risk goal, a WRS statistical test was performed that compares the arsenic concentrations in the AP3 surface soil data set to that of PBOW background. A WRS test result with a p-value less than 0.05 is regarded as indicating that two data sets are different. The p-value for this AP3 surface soil versus the PBOW background data set is 0.27 (Appendix E). Because this value is not less than 0.05, the AP3 surface soil data set is not regarded as significantly different from background. Therefore, the ILCR associated with arsenic is not regarded as being related to former PBOW operations. If the cancer risk contributions of arsenic in surface soil are excluded based on non-site relatedness, the resulting ILCR for this receptor is 1E-6; this value is less than the PBOW cancer risk goal and equals the low end of the NCP cancer risk management range.

The total HI for the current groundskeeper (Table 5-1) is 0.2. This is less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

5.3.2 Future Groundskeeper

The exposure assumptions for the future groundskeeper differ from those of the current groundskeeper (Section 5.3.1) in that the future groundskeeper is assumed to be exposed to total soil rather than surface soil, and the future groundkeeper is also assumed to be exposed to overburden groundwater via direct contact (ingestion and dermal exposure).

The total ILCR for the future groundskeeper, assuming hypothetical use of overburden groundwater, is 6E-5 (Table 5-1). This value is within the NCP risk management range but exceeds the PBOW target cancer risk goal of 1E-5. Approximately 70 percent of this value is associated with exposure to arsenic (ILCR=4.2E-5) in groundwater.

Arsenic was detected in two of the six overburden groundwater samples, both of which were collected in May 2012 with Snap Samplers. Each of the detections was “J” qualified as less than the reporting limit. Arsenic in AP3 groundwater is not regarded as resultant from former site operations for the following reasons:

- The two detected concentrations (5.2J µg/L [AP3-MW2] and 9.9 µg/L [AP3-MW01]) are similar to the range of detected concentrations in PBOW background groundwater (3.3 to 7.4 µg/L).

- Arsenic has not been identified as being part of any production processes or waste streams at PBOW.

- Arsenic was not found to be present in the overlying soils at concentrations significantly greater than PBOW background (see discussion below).

It is also noted that both detected concentrations were less than the maximum concentration limit of 10 µg/L for arsenic in drinking water.

If the potential cancer effects associated with arsenic in groundwater are excluded because of non-site relatedness, the resulting total ILCR is 2E-5 (Table 5-1). This is within the 1E-6 to 1E-4 NCP risk management range but exceeds the PBOW cancer risk goal of 1E-5. Approximately 80 percent of this value is associated with arsenic in total soil. Arsenic was identified as a COPC in total soil because the concentration (44.1 mg/kg) in surface soil sample AP3-SB08 slightly exceeded the BSC (36.5 mg/kg). Because the ILCR for this receptor exceeds the PBOW cancer risk goal, a WRS statistical test was performed that compares the arsenic concentrations in the AP3 total soil data set to that of PBOW background. The p-value for this AP3 total soil data set versus the PBOW background data set is 0.097 (Appendix E). Because this value exceeds 0.05, the AP3 total soil arsenic data set is not regarded as significantly different from background soil arsenic concentrations. Therefore, the ILCR associated with arsenic in total soil is not regarded as being related to former PBOW operations.

If the contribution of arsenic to the ILCR in surface soil is excluded, the resulting ILCR for this receptor is 9E-7. This value is less than the NCP cancer risk management range and the PBOW cancer risk goal.

The total HI for the future groundskeeper, assuming hypothetical use of overburden groundwater, is 0.7 (Table 5-1). This is less than the target HI goal of 1, indicating that noncancer health effects are regarded as unlikely to occur under this scenario. Approximately 84 percent of this value is associated with background-related inorganics in groundwater, chiefly arsenic (discussed above) and manganese (Section 5.3.5). If groundwater exposure pathways are appropriately excluded for this receptor because the noncancer hazards are associated with naturally occurring constituents, the HI (0.1) is even lower (Table 5-2).

5.3.3 Future Indoor Worker

The exposure assumptions for the future indoor worker include direct contact with surface soil, inhalation of volatiles from subsurface soil, and direct exposure with overburden groundwater via direct contact (ingestion and dermal exposure). The total ILCR for the future indoor worker, assuming hypothetical use of overburden groundwater, is 5E-5 (Table 5-1). This value is within the NCP risk management range but exceeds the PBOW target cancer risk goal of 1E-5. Approximately 84 percent of this value is associated with exposure to arsenic (ILCR=4.2E-5) in groundwater.

As described in Section 5.3.2, the presence of arsenic in AP3 overburden groundwater appears to be unrelated to former PBOW operations. If the potential cancer effects associated with arsenic in groundwater are thus excluded, the resulting total ILCR is 8E-6 (Table 5-2). This is within the 1E-6 to 1E-4 NCP risk management range and less than the PBOW cancer risk goal of 1E-5. Approximately 80 percent of this soil-based value is associated with arsenic in surface soil. Arsenic was identified as a COPC in surface soil because the concentration (44.1 mg/kg) in surface soil sample AP3-SB08 slightly exceeded the BSC (36.5 mg/kg). As described in Section 5.3.2, arsenic in surface soil is not significantly different from background.

If the contribution of arsenic to the ILCR in surface soil is excluded, the resulting ILCR for this receptor is 3E-7 (Table 5-2). This value is less than the NCP cancer risk management range and the PBOW cancer risk goal.

The total HI for the future indoor worker, assuming hypothetical use of overburden groundwater, is 0.7 (Table 5-1). This is less than the target HI goal of 1, indicating that noncancer health effects are regarded as unlikely to occur under this scenario. Approximately 89 percent of this value is associated with background-related inorganics in groundwater, chiefly arsenic (discussed above) and manganese (Section 5.3.5). If the groundwater exposure pathways are appropriately excluded for this receptor because the noncancer hazards are associated with naturally occurring constituents, the HI (0.07) is even lower (Table 5-2).

5.3.4 Construction Worker

The construction worker is assumed to be exposed to COPCs in total soil, both through direct contact and via inhalation of suspended particulates, and to sediment and surface water, via direct contact. The resulting ILCR of the AP3 construction worker is estimated as 1E-6 (Table 5-1). This equals the low end of the 1E-6 to 1E-4 NCP risk management range and is less than the PBOW cancer risk goal of 1E-5.

The total HI for the construction worker (Table 5-1) is 0.4. This is less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

5.3.5 Hypothetical Future On-Site Resident

The exposure assumptions for the hypothetical future resident include direct contact with total soil, inhalation of particulates from total soil, inhalation of volatiles from subsurface soil, direct exposure to sediment and surface water (ingestion and dermal exposure), and direct exposure with groundwater via direct contact (ingestion and dermal exposure). The ILCR was calculated assuming exposure during a combined 30-year child/adult exposure duration, whereas separate noncancer HI values were calculated for the young child and adult life stages (Section 3.1.3.5). The results of each are described below.

The total ILCR for the hypothetical future resident, assuming overburden groundwater exposure, is 2E-4 (Table 5-1). This value exceeds both the NCP risk management range and the PBOW target cancer risk goal. Approximately 76 percent of this value is associated with exposure to overburden groundwater, all of which is associated with exposure to arsenic (ILCR=1.8E-4) in groundwater. As described in Section 5.3.2, arsenic does not appear to be associated with former PBOW operations.

If the contributions of the hypothetical groundwater exposure pathways are appropriately excluded because of the non-site relatedness of arsenic in groundwater, the resulting ILCR for this receptor is 6E-5. This value is within the NCP risk management range but exceeds the PBOW cancer risk goal. Approximately 97 percent of this ILCR value is associated with exposure to total soil, and approximately 92 percent of the total ILCR value (minus groundwater) is associated with arsenic in soil. As described in Section 5.3.2, arsenic concentrations in total soil are not significantly greater than PBOW background soil. The ILCR (i.e., excluding groundwater) for this receptor without the contributions of background-related arsenic in soil is 5E-6, which is less than the PBOW cancer risk goal.

The total HI for the hypothetical future child resident, assuming overburden groundwater exposure, is 5 (Table 5-1). This exceeds the target HI value of 1, which would seem to indicate that noncancer health effects cannot be regarded as unlikely to occur. Approximately 76 percent of this HI is associated with exposure to overburden groundwater, and approximately 87 percent of the groundwater HI is associated with arsenic (HQ=1.7) and manganese (HQ=1.6) in groundwater. As described in Section 5.3.2, arsenic concentrations in overburden groundwater do not appear to be related to former PBOW activities. Manganese was not selected as a COPC in total soil, which indicates that no site-related soil contamination was identified that may have

consequently leached to the underlying groundwater. Therefore, manganese in AP3 groundwater does not appear to have originated from any site-related activities. Also, please note that groundwater manganese concentrations exceeding the BSC (636 µg/L) were found only in well AP3-MW01 (1,760 and 779 µg/L), but not in the four samples from the other wells (52 to 472 µg/L).

If the groundwater pathway is appropriately excluded because the chemicals responsible for the elevated HI are unrelated to former U.S. Department of Defense activities, then the total HI for the hypothetical future child resident exposed to AP3 total soil, sediment, and surface water is 1 (Table 5-2). This value equals the target HI goal of 1, indicating that adverse noncancer health effects are unlikely.

The total HI for the hypothetical future adult resident, assuming overburden groundwater exposure, is 2 (Table 5-1). This exceeds the target HI value of 1, which indicates that noncancer health effects are not regarded as unlikely to occur. As discussed above for the hypothetical future child resident, most of the contribution to this HI is associated with arsenic and manganese in overburden groundwater, which are evidently unrelated to former PBOW activities. Thus, the contribution of the groundwater exposure may be appropriately excluded to evaluate for potential Department of Defense-related hazards. The resultant total HI for the hypothetical future adult resident exposed to AP3 total soil, sediment, and surface water is 0.1 (Table 5-2), which is less than the target HI goal of 1.

5.3.6 Adult Hunter

The ILCR for the future adult hunter (Table 5-1) exposed to surface soil both through direct contact and via the ingestion of venison is estimated as 1E-6. This equals the low end of the 1E-6 to 1E-4 NCP risk management range and is less than the PBOW cancer risk goal of 1E-5.

The total HI for the adult hunter (Table 5-1) is 0.009. This is far less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

5.3.7 Hunter's Child

The ILCR for the hunter's child (Table 5-1) exposed to surface soil via the ingestion of venison from deer which grazed on site cannot be quantified because none of the carcinogenic COPCs in surface soil bioaccumulate in food. Cancer risks associated with PBOW to this receptor are regarded as de minimis and less than the 1E-6 to 1E-4 NCP risk management range and the PBOW cancer risk goal of 1E-5.

The total HI for the future hunter's child is 1E-6 (Table 5-1). This is far less than the target HI value of 1, indicating that noncancer health effects are unlikely to occur.

6.0 Uncertainty Analysis

The primary objective of the BHHRA is to characterize and quantify potential human health risks. However, these risks are estimated using incomplete and imperfect information that introduces uncertainties at various stages of the risk assessment process. Uncertainties associated with earlier stages of the risk assessment become magnified when they are linked with other uncertainties in the latter stages. Reliance on a simplified numerical presentation of dose rate and risk without consideration of uncertainties, limitations, and assumptions inherent in their derivation can be misleading. For example, the calculated ILCR for a given scenario "A" may be 1E-5 (meets the PBOW risk goal) and that of scenario "B" may be 5E-5 (exceeds the PBOW risk goal). However, if the uncertainties associated with scenario "B," for instance, span orders of magnitude and the ILCR is regarded as biased high, it is not unlikely that scenario "A" actually presents a higher risk of developing cancer.

The chief goal of this analysis is to evaluate uncertainties and present them in context of their potential impact on the interpretation of the risk assessment results and the types of environmental management decisions that may be based on these results. The uncertainty analysis does not exhaustively describe all potential uncertainties but presents those that have the largest implications for the interpretation of the risk assessment results. This analysis also summarizes the types and, as applicable, the magnitude of the uncertainties at each stage of the risk assessment. Although the discussion in the following sections includes generic uncertainties that are common to the state of human health risk assessment practice overall (e.g., additivity of health effects in the risk characterization), the uncertainty analysis focuses on the sets of uncertainties that are specific to AP3.

6.1 Types of Uncertainty

Uncertainties in risk assessment are categorized into two general types: 1) variability inherent in the (true) heterogeneity of the data set, measurement precision, and measurement accuracy; and 2) uncertainty that arises from data gaps. Estimates of the degree of variability tend to decrease as the sample size increases. This is because larger data sets are less impacted by individual samples/measurements and typically allow for greater accuracy. Uncertainty that arises from data gaps is addressed by applying models and assumptions. Models are applied because they represent a level of understanding to address certain exposure parameters that are impractical or impossible to measure (e.g., COPC concentrations in air that would result from groundwater use that has not yet occurred—or may never occur—at the site). Assumptions represent an educated estimate to address information that is not available (e.g., additivity of carcinogens).

6.2 Sources of Uncertainty

The discussion in Sections 6.2.1 through 6.2.8 provide an overview of uncertainty, with a focus on those sources that are most likely to affect interpretation of the risk assessment results.

6.2.1 Sample Selection

Soil samples were collected from within the former AP3 area, where ash waste was deposited. The well locations were selected from within and adjacent to AP3, including downgradient areas. Surface water and sediment sample locations were selected within AP3 and along the drainage ditch emanating from AP3 to the west. The sample locations appear to be representative of the site, and no information suggests that the selection of these locations has introduced an identifiable bias.

6.2.2 Laboratory Analysis

State-of-the-practice SW-846 laboratory methods were used for analysis of the RI samples (Shaw, 2010; 2013). For metals in groundwater, this included Method 6010b, which utilizes inductively coupled plasma spectrometry. This method is subject to electronic interferences, particularly at concentrations less than the reporting limit. Site investigation samples, also used in this BHHRA, were collected in 1999 (USACE, 2000). No laboratory analytical data quality issues were identified that affected the BHHRA results.

6.2.3 Exposure-Point Concentration Estimates

Uncertainty is introduced in the statistical approach used to calculate the EPCs. As stated in the HHEM (EPA, 1989a), the average concentration of the site should be used as the concentration term. Generally, a UCL is used to account for the uncertainty of using a sample data set to estimate the true population mean concentration for the site. ProUCL Version 4.1 software (EPA, 2011) was used to calculate the EPCs for those media with five or more samples. However, as is readily observed by reviewing the ProUCL output (Appendix B), the calculation of the UCL can vary with methodology. It is unclear whether the UCL value of a specific EPC would result in an underestimate or overestimate of the true population mean. However, the general use of a UCL on all the data sets, even given the uncertainty as to whether a given method provides full coverage at 95 percent confidence, would result in general overestimation of the population mean and associated risks. Therefore, as intended by the guidance (EPA, 1989a), this practice of using the UCL as the EPC (note that the MDC is used as the EPC if the UCL exceeds the MDC) introduces bias that tends to overestimate the population mean and the resultant risk values.

Sediment data sets have fewer than five samples. Thus, the MDC was used as the EPC for these data sets. Use of the MDC likely introduces a high bias to the risk values.

6.2.4 Land-Use Assumptions/Receptor Selection

The current groundskeeper is intended to represent an on-site worker under the current land use as NASA-controlled property. Because there is currently no identified NASA activity at AP3, the use of this receptor likely overestimates risks and hazards to a current site worker. The assumed future use of the hunter and the hunter's child are reasonable, as other areas within PBOW may currently be legally hunted by permit.

Unrestricted land use, including hypothetical future residential use, is a reasonable assumption for the future at AP3, given the rural residential use of property adjacent to the PBOW facility. However, AP3 is a low-lying former impoundment and is inundated throughout much of the year. Therefore, AP3 would have to be covered with several feet of soil before an industrial or residential building could be constructed at the site. This would essentially eliminate future exposure of the resident or long-term site worker (i.e., groundskeeper or indoor worker) to current AP3 surface or subsurface soil. Because of the apparent shallowness of the overburden groundwater as evidenced by the inundation, a basement could not likely be constructed. Therefore, exposure of a future construction worker to total soil would be minimized.

6.2.5 Exposure Assumption Values

The exposure assumption values used in the exposure assessment (Table 3-1) are selected to represent either an upper bound (e.g., 95th percentile) or mid-range value, depending on the particular parameter. Mathematically combining these terms in exposure equations is generally thought to result in decidedly conservative exposure estimations (Cogliano, 1997; Burmaster and Harris, 1993). However, this conservativeness is associated with the state of risk assessment practice, which attempts to focus on the upper end of exposure possibilities rather than more realistic levels of exposure, and not on assumptions made specifically for AP3. The assumption that overburden groundwater underlying AP3 could be used as a potable source is conservative, as it is unknown whether the groundwater in the vicinity of AP3 would provide ample yield for residential use. This question concerning yield is based on the limited yield in the overburden/shale unit underlying most of PBOW. However, water yield in the three AP3 wells was adequate for low-flow sampling, which indicates that use of AP3 groundwater may be plausible.

6.2.6 Toxicity Assessment

Uncertainties associated with the toxicity assessment include those regarding development of the health effects criteria values, the classification of potential carcinogenicity, the extrapolation of exposure route-specific toxicity values to other routes of exposure, and the extrapolation of toxic

effects observed in animal studies to potential adverse effects in humans. A general summary of these uncertainties is provided in the following paragraphs.

The development of health effects criteria for noncancer effects involves considerable professional judgment. An uncertainty factor of up to 10 may be applied to a toxicologically identified benchmark dose or concentration to address the unknown regarding each of the following (EPA, 1989b): lowest-observed-adverse-effects level to no-observed-adverse-effects level, subchronic-to-chronic extrapolation, route-to-route extrapolation, and species-to-species extrapolation. A "modifying factor" of 10 or less is likewise applied in the development of RfDs and RfCs, using professional judgment. This modifying factor is intended to address gaps in the database and steepness of the dose-response curve. In practice, the overall UF, derived by multiplying the individual uncertainty factors by the modifying factor, associated with RfD and RfC values may span up to four orders of magnitude.

This BHHRA used an RfD for thallium that was withdrawn from IRIS (EPA, 2013) in September 2010. This RfD was withdrawn because the thallium studies were judged to be of poor quality. To account for this poor quality, EPA formerly included a UF of 3,000, which is the maximum that EPA uses for verified RfDs. Inclusion of an RfD for thallium with this high UF is likely to introduce a conservative bias. The fact that EPA has withdrawn the RfD for thallium should be considered in any environmental decision related to the potential effects of thallium on human health.

The EPA weight-of-evidence classification system for carcinogens is used to examine and classify chemical agents with respect to their carcinogenic potential. Most EPA potential carcinogens are classified based on animal data, without sufficient human data to support a causal association (i.e., former Group B2 (Section 4.1]). Also, the linearized multistage (LMS) mathematical model was used to extrapolate values from relatively high-dose rodent studies to relatively low-dose human exposures in the development of SFs for these compounds. This application of the LMS model is the subject of much controversy. Thus, the LMS approach used to develop SFs, combined with other assumptions, tends to overestimate potential risks.

Overall, the toxicity values, assuming similar effects between humans and test species, tend to result in overestimates of noncancer hazards or cancer risks. However, it is possible that a given chemical can elicit a toxic response in humans that is not observed in the laboratory species studied or that humans may be more sensitive to a given chemical. In this instance, it is possible for the use of the toxicity values to result in underestimates of risks/hazards.

6.2.7 Risk Characterization

It is assumed that the effects of simultaneous exposures to multiple carcinogens at a site are additive. Likewise, it is assumed that noncancer effects of contaminants are additive if they have a similar mechanism of toxicity. In risk assessment practice, it is assumed that the effects of chemicals that affect the same target organ are additive unless chemical-specific information would dictate otherwise. However, chemicals in combination may act additively, synergistically, or antagonistically or may not influence one another at all. Therefore, depending on the interactive effects (if any), the risk characterization approach to multiple contaminants may lead to either underestimates or overestimates of potential risk/hazard.

6.2.8 Evaluation of Selected COPCs for Site Relatedness

As described in Section 2.4.3, a comparison of naturally occurring metals is performed in two steps. The first is a comparison to BSCs; a chemical whose MDC does not exceed the BSC is assumed to be related to background and thus eliminated from further evaluation. The second step is performed for selected metals and organic compounds during the risk characterization step, after exposure calculations are performed which include the potential background-related contributions as part of the overall ILCR and HI results.

For inorganics, this risk characterization background evaluation step typically includes a statistical comparison of the site data set to the background data set using the WRS statistical test as appropriate (Section 2.4.3.2). The WRS output and box-and-whisker plots are provided in Appendix E. Note that no suitable background data sets exist for overburden groundwater, sediment, or surface water.

The WRS tests were run for the two metal COPCs in AP3 surface soil and total soil. The concentrations of neither arsenic ($p=0.27$) nor thallium ($p=0.90$) in surface soil were found to differ significantly from PBOW background concentrations. Similarly, the WRS results for AP3 total soil indicate that the concentrations of neither arsenic ($p=0.097$) nor thallium ($p=0.28$) differ significantly from those found in PBOW background soil.

With respect to groundwater, there is no background data set used to screen out naturally occurring inorganics in overburden groundwater. Thus, carrying inorganics forward into the risk characterization is a conservative decision. The concentrations of inorganics found in AP3 overburden groundwater were generally comparable to the background data set used for the limestone bedrock groundwater. None of the inorganic groundwater COPCs have been identified with any former PBOW waste streams. The inorganics with the highest cancer risk (arsenic) and noncancer hazard (arsenic and manganese [soil only]) are evidently unrelated to former PBOW

site operations. Manganese was not identified as an AP3 soil COPC, and AP3 soil concentrations of arsenic were shown to be statistically similar to those of the PBOW background data set. Therefore, the arsenic and manganese in AP3 groundwater apparently do not result from contamination in soil. These observations provide further evidence that the inclusion of groundwater inorganics in the risk characterization biases the risk/hazard estimates high.

7.0 Summary and Conclusions

7.1 Summary

The BHHRA was conducted to evaluate cancer risk and noncancer hazards associated with AP3 surface soil, subsurface soil, overburden groundwater, surface water, and sediment. It is noted that the BHHRA, including the evaluation of future uses and groundwater use, was conducted to meet administrative requirements, including FUDS regulations (USACE, 2004). Exposure and risk/hazard associated with the COPCs were evaluated using the following receptors (media evaluated in parentheses):

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil, groundwater)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only], groundwater)
- Current/future construction worker (total soil, surface water, sediment)
- Hypothetical future resident (total soil, surface water, sediment, overburden groundwater,)
- Future adult hunter (surface soil, including venison pathway)
- Future hunter's child (surface soil [venison pathway only]).

The resident was evaluated for noncancer hazards separately for the young child (ages 1 through 6 years) and adult life stages.

The overall HI and ILCR values are summarized in the following bullets; exceedances of PBOW cancer risk goal (ILCR>1E-5) are shown as bold and exceedances of the noncancer hazard goal (HI>1) or the NCP risk management range (1E-6 to 1E-4) are shown as bold italics:

- Current groundskeeper: ILCR = **2E-5** (1E-6 excluding background-related arsenic); HI = 0.2
- Future groundskeeper: **ILCR = 6E-5** (1E-6 excluding background-related arsenic); HI = 0.1
- Future groundskeeper excluding groundwater: ILCR = **2E-5** (9E-7 excluding background-related arsenic in soil); HI = 0.1

- Future indoor worker: ILCR = **5E-5**; HI = 0.7
- Future indoor worker excluding groundwater: ILCR = 8E-6; HI = 0.1
- Construction worker: ILCR = 1E-6; HI = 0.4
- Hypothetical future resident: ***ILCR = 2E-4***; ***child HI = 5; adult HI = 2***
- Hypothetical future resident excluding groundwater: ILCR = **6E-5** (5E-6 excluding background-related arsenic in soil); child HI = 1; adult HI = 0.1
- Future hunter: ILCR = 1E-6; HI = 0.009
- Future hunter's child: HI = 0.000001; none of the carcinogenic COPCs is bioaccumulative; cancer risks are assumed to be de minimis.

No construction is currently planned at AP3, and no groundskeeping of any sort appears to be occurring at AP3. Therefore, the current groundskeeper, which assumes a full-time, 25-year employee who works exclusively at the AP3 for 250 days per year, represents an extreme overestimate of exposure to any current receptor. It is also noted that because AP3 is a low-lying former impoundment and is frequently inundated, several feet of fill would have to be placed on the current surface before any construction could reasonably occur at the site. Therefore, potential exposure to current AP3 surface or subsurface soil is likely minimal for any receptor, even under unrestricted future use. Therefore, cancer risks and noncancer hazard estimates associated with soil in this BHHRA that assume future development are likely exaggerated.

7.2 Conclusions

The ILCR values for each of the AP3 exposure scenarios are within (or less than) the NCP risk management range and the PBOW cancer risk goal of 1E-5, except the hypothetical future resident who is assumed to be exposed to groundwater. As presented in Section 5.3.5, arsenic, which is responsible for the ILCR associated with groundwater, is evidently unrelated to former PBOW activities. Therefore, the future groundskeeper, future indoor worker, and future resident were re-evaluated without the contribution of arsenic in groundwater. Of these, the future groundskeeper and future resident (even excluding groundwater) exceed the PBOW ILCR goal, as does the current groundskeeper. Nearly all of this ILCR is associated with arsenic in soil, which was observed at concentrations that are not statistically significantly greater than those found in the PBOW background soil data set. If the contributions of arsenic in soil are excluded from the ILCR based on a lack of site relatedness, then the ILCR value for each of the receptors is less than the PBOW ILCR goal.

The HI values of each of the AP3 receptors, except the future adult and child resident assumed to use overburden groundwater, meet the noncancer target HI of 1. Arsenic and manganese in overburden groundwater are responsible for the elevated HI values for the adult and child resident. As presented in Section 5.3.5, the sources of these inorganics in groundwater are evidently unrelated to former site operations, and they appear to be naturally occurring. If the contributions of these naturally occurring inorganics in groundwater are appropriately excluded from the adult and child resident HI estimates, all receptors meet the HI goal of 1.

Because AP3 is in a low area and frequently inundated, additional soil would need to be added to the site before construction could commence, minimizing the potential for exposure to current site soil. Therefore, cancer risks and noncancer hazard estimates associated with soil in this BHHRA that assume future development (i.e., each receptor except the hunter and hunter's child) are likely exaggerated.

8.0 References

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TABLES

Table 2-1

Summary of Samples Evaluated
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Location	Sample Number	Sample Type	Sample Date	Depth (ft)	Analyses
SOIL					
Surface Soil					
ASH PIT 3-SB01	AP0032	REG	19-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB02	AP0036	REG	19-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0051	REG	21-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB03	AP0039	REG	19-Aug-09	0.2 - 1.7	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0048	REG	20-Aug-09	0.2 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB04	AP0042	REG	21-Aug-09	0.3 - 0.8	Exp, Metals, PCB, SVOC
ASH PIT 3-SB05	AP0045	REG	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0054	REG	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0056	FD	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
Subsurface Soil					
ASH PIT 3-SB04	AP0043	REG	21-Aug-09	0.8 - 1.5	Exp, Metals, PCB, SVOC
ASH PIT 3-SB05	AP0046	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0049	REG	20-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0052	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0059	FD	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0055	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB02	AP0037	REG	19-Aug-09	1.2 - 2.3	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0061A	REG	20-Aug-09	2 - 2.7	Exp, Metals, PCB, SVOC
ASH PIT 3-SB01	AP0033	REG	19-Aug-09	3 - 5	Exp, Metals, PCB, SVOC
OVERBURDEN GROUNDWATER					
AP3-MW01	AP3083	REG	12/19/2011	1.3 - 1.3	Exp, Field Tests, Gen Chem, Metals (f & uf), SVOC, VOC
AP3-MW01	AP3084	FD	12/19/2011	1.3 - 1.3	Exp, Gen Chem, Metals (f & uf), SVOC, VOC
AP3-MW01	AP3088	REG	5/30/2012	0 - 0	Exp, Gen Chem, Metals, VOC
AP3-MW02	AP3086	REG	12/16/2011	10.02 10.19	Exp, Field Tests, Gen Chem, Metals, SVOC, VOC
AP3-MW02	AP3091	REG	5/30/2012	0 - 0	Exp, Gen Chem, Metals, VOC
AP3-MW03	AP3087	REG	12/20/2011	7.22 - 7.41	Exp, Field Tests, Gen Chem, Metals (f & uf), SVOC, VOC
AP3-MW03	AP3092	REG	5/30/2012	0 - 0	Exp, Gen Chem, Metals, VOC
SEDIMENT					
AP3-SD01	AP1009	REG	23-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP3-SD02	AP1010	REG	23-May-09	0 - 0.5	Exp, PCB
AP3-SD03	AP1011	REG	23-May-09	0 - 0.5	Exp, PCB
PBOW99-SDA302	PBOW99SDA302	REG	11-Jun-99	0 - 0	Metals, SVOC
PBOW99-SDA303	PBOW99SDA303	REG	11-Jun-99	0 - 0	Metals, SVOC

Table 2-1

Summary of Samples Evaluated
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Location	Sample Number	Sample Type	Sample Date	Depth (ft)	Analyses
PBOW99-SDA303	PBOW99SDA303DUP	FD	11-Jun-99	0 - 0	Metals, SVOC
SURFACE WATER					
AP3-SW01	AP2009	REG	23-May-09	NA	Exp
AP3-SW02	AP2010	REG	23-May-09	NA	Exp
AP3-SW03	AP2011A	REG	27-May-09	NA	Exp
PBOW99-SWA301	PBOW99SWA301	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA302	PBOW99SWA302	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA303	PBOW99SWA303	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA303	PBOW99SWA303DUP	FD	11-Jun-99	NA	Metals, SVOC

ft bgs - Feet below ground surface.
FD - Field duplicate; averaged with the regular sample at the same location to create one result.
REG - Regular sample.
Exp - Explosives.
f & uf - Metals analysis performed on filtered and unfiltered samples, respectively.
Gen Chem - General chemistry.
Metals - Metals analysis performed on unfiltered samples unless otherwise noted.
PCB - Polychlorinated biphenyls.
SVOC - Semivolatile organic compounds.
VOC - Volatile organic compounds.

Table 2-2

Background Screening Concentrations of Inorganics in Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works
Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits [a]	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Concentration [c]
Aluminum	12 / 12	3520 - 15500	22.6 - 26.5	L	8.43E+03	2.69E+04	15500
Antimony	9 / 25	5.9 - 9.3	5.4 - 8.0	NP	4.68E+00	NA	9.30
Arsenic	23 / 26	2.1 - 36.5	1.1 - 24.7	L	1.08E+01	7.10E+01	36.5
Barium	9 / 12	35.6 - 826	22.6 - 26.5	L	1.16E+02	1.30E+03	826
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	566 - 663	L	1.13E+04	2.18E+05	52300
Chromium	25 / 26	4.4 - 29	1.1 - 12.3	NP	1.34E+01	NA	29.0
Cobalt	9 / 12	9.6 - 116	5.7 - 61.7	L	2.26E+01	2.48E+02	116
Copper	23 / 26	2.3 - 56.2	2.2 - 3.3	L	1.70E+01	1.47E+02	56.2
Iron	12 / 12	5880 - 234000	11.3 - 123	L	4.01E+04	3.58E+05	234000
Lead	26 / 26	1.9 - 48.6	0.34 - 7.4	L	1.28E+01	5.13E+01	48.6
Magnesium	12 / 12	629 - 10400	566 - 663	L	3.26E+03	3.08E+04	10400
Manganese	26 / 26	21 - 13300	1.7 - 18.5	L	7.29E+02	3.51E+03	3506
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	0.085
Nickel	26 / 26	5.4 - 55.1	4.5 - 5.3	L	2.28E+01	7.79E+01	55.1
Potassium	11 / 12	579 - 3390	566 - 663	L	1.24E+03	6.08E+03	3390
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	11.1
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30
Vanadium	11 / 12	9 - 40.9	5.7 - 61.7	L	2.48E+01	8.31E+01	40.9
Zinc	26 / 26	6.6 - 655	0.57 - 12.3	L	7.30E+01	3.22E+02	322

L - Lognormal; mg/kg - milligrams per kilogram; NP - nonparametric; NA - not applicable; not available.

[a] A single background sample had to be diluted such that the reporting limits of this sample (BCG-SB01, 6990) were elevated 10 or 20 times higher than they would have been if not diluted. This affects the maximum reporting limit shown for arsenic, chromium, cobalt, iron, lead, manganese, and vanadium. Reporting limits for these analytes in all other samples were much lower, approximately by an order of magnitude or more in each case.

[b] 95% UTL - 95% upper tolerance limit calculated as described in IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , Plum Brook Ordnance Works, Sandusky, Ohio, August.

[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used. This approach was agreed upon for all future Plum Brook Ordnance Works (PBOW) risk assessments by the PBOW Project Delivery Team (PDT) during the May 10, 2000 PDT meeting.

Note: Detection limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The detection limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Source: IT, 2001, *TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment* , *Final, Former Plum Brook Ordnance Works, Sandusky, Ohio* , November, and reports referenced therein, including IT (1998).

Table 2-3

Background Screening Concentrations of Inorganics in Groundwater
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of Values, µg/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Mean µg/L	Standard Deviation	UTL [a] µg/L	BSC [b] µg/L
Metals - Unfiltered										
Aluminum	11 / 13	85	3.15E+01	3.09E+02	2.00E+02	2.00E+02	1.05E+02	6.98E+01	4.17E+02	309
Arsenic	4 / 26	15	3.30E+00	7.40E+00	1.00E+01	1.00E+01	4.99E+00	6.56E-01	7.92E+00	7.4
Barium	28 / 28	100	2.58E+01	1.18E+04	2.00E+02	2.00E+03	1.73E+03	3.77E+03	1.86E+04	11800
Calcium	28 / 28	100	1.74E+04	3.16E+05	5.00E+03	5.00E+03	1.38E+05	8.31E+04	5.09E+05	316000
Cobalt	6 / 27	22	1.00E+00	1.21E+01	5.00E+01	5.00E+01	2.05E+01	8.75E+00	5.96E+01	12.1
Copper	2 / 28	7	3.30E+00	1.98E+01	2.50E+01	2.50E+01	1.24E+01	2.26E+00	2.25E+01	19.8
Iron	24 / 27	89	3.82E+01	1.55E+03	1.00E+02	1.00E+02	4.15E+02	4.87E+02	2.59E+03	1550
Magnesium	28 / 28	100	7.28E+03	2.17E+05	5.00E+03	5.00E+03	7.17E+04	5.85E+04	3.33E+05	217000
Manganese	28 / 28	100	3.60E+00	6.88E+02	1.50E+01	1.50E+01	8.12E+01	1.24E+02	6.36E+02	636
Nickel	4 / 27	15	4.80E+00	8.60E+00	4.00E+01	4.00E+01	1.81E+01	4.67E+00	3.90E+01	8.6
Potassium	28 / 28	100	2.53E+03	1.16E+05	5.00E+03	5.00E+04	2.70E+04	3.06E+04	1.64E+05	116000
Sodium	28 / 28	100	1.33E+04	1.39E+06	5.00E+03	5.00E+04	3.55E+05	4.36E+05	2.30E+06	1390000
Zinc	14 / 19	74	8.30E-01	5.07E+02	2.00E+01	2.00E+01	5.55E+01	1.23E+02	6.06E+02	507

[a] The UTL (upper tolerance limit) is calculated as described in Shaw (2005).

[b] The BSC (background screening criterion) is the calculated UTL or the maximum detected concentration, whichever is less.

µg/L - Micrograms per liter

BTEX - Benzene, toluene, ethylbenzene, and xylene

Source: Shaw Environmental, Inc. (Shaw), 2005*2004 Data Summary and Evaluation Report, Final, Plum Brook Ordnance Works, Sandusky, Ohi*, April.

Table 2-4

Statistical Summary and Selection of COPCs in Surface Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	8 / 8	100	4.76E+03		9.35E+03		1.30E+01	2.90E+01	7.69E+03	1.55E+04	7700		N (b)		---
Antimony	2 / 8	25	1.20E+00	J	2.34E+00	/UJ	3.80E+00	9.30E+00	2.81E+00	9.30E+00	3.1		N (a)		---
Arsenic	8 / 8	100	4.90E+00		4.41E+01		5.00E-01	1.20E+00	1.65E+01	3.65E+01	0.39		Y	2.88E+01	2.88E+01
Barium	8 / 8	100	3.85E+01		2.03E+02		1.30E+01	2.90E+01	9.32E+01	8.26E+02	1500		N (a)		---
Beryllium	8 / 8	100	4.10E-01	J	2.10E+00		3.10E-01	7.40E-01	1.19E+00	1.00E+00	16		N (a)		---
Cadmium	3 / 8	38	3.00E-01	J	4.40E-01		2.50E-01	3.10E+00	5.26E-01	NA	7		N (a)		---
Calcium	8 / 8	100	2.06E+03		1.63E+04		3.10E+02	7.40E+02	1.16E+04	5.23E+04	Nutrient		N (c)		---
Chromium	8 / 8	100	6.90E+00		1.66E+01		1.30E+00	3.00E+00	1.20E+01	2.90E+01	0.29		N (b)		---
Cobalt	8 / 8	100	4.50E+00		8.90E+00		3.10E+00	7.40E+00	6.32E+00	1.16E+02	2.3		N (b)		---
Copper	8 / 8	100	1.16E+01		1.24E+02		1.60E+00	3.70E+00	3.72E+01	5.62E+01	310		N (a)		---
Iron	8 / 8	100	1.24E+04	J	6.83E+04		6.30E+00	1.60E+01	2.69E+04	2.34E+05	5500		N (b)		---
Lead	8 / 8	100	3.90E+00	J	2.04E+01		6.30E+00	1.60E+01	1.10E+01	4.86E+01	400		N (a)		---
Magnesium	8 / 8	100	3.43E+02	J	5.00E+03	J	3.10E+02	7.40E+02	2.20E+03	1.04E+04	Nutrient		N (c)		---
Manganese	8 / 8	100	5.45E+01		3.53E+02	J	1.10E+00	2.30E+00	2.25E+02	3.51E+03	180		N (b)		---
Mercury	6 / 8	75	3.60E-02	J	1.50E-01		1.10E-01	2.40E-01	8.49E-02	8.50E-02	2.3		N (a)		---
Nickel	8 / 8	100	1.15E+01		2.29E+01		2.50E+00	5.90E+00	1.57E+01	5.51E+01	150		N (a)		---
Potassium	8 / 8	100	5.24E+02	J	1.29E+03	J	6.30E+02	1.50E+03	9.34E+02	3.39E+03	Nutrient		N (c)		---
Selenium	8 / 8	100	5.90E-01	J	2.90E+00	J	6.30E+00	1.60E+01	1.74E+00	2.00E+00	39		N (a)		---
Sodium	8 / 8	100	1.68E+02	J	5.70E+02	J	6.30E+02	1.50E+03	4.09E+02	NA	Nutrient		N (c)		---
Thallium	1 / 8	13	3.00E+00	U	3.00E+00	U	6.30E-01	6.50E+00	1.85E+00	1.30E+00	0.078		Y	2.69E+00	2.69E+00
Vanadium	9 / 9	100	1.07E+01		2.89E+01		3.00E+00	7.80E+00	2.04E+01	4.09E+01	39		N (a)		---
Zinc	9 / 9	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.91E+01	3.22E+02	2300		N (a)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	2 / 8	25	1.50E-02	J	4.30E-02	J	2.20E-02	5.00E-02	2.08E-02		0.22		N (a)		---
Explosives															
Dinitrotoluene, 2,6-	3 / 8	38	5.62E-02	J	6.62E-02	JJ	1.60E-01	1.90E-01	7.67E-02		0.71		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 8	13	5.16E-02	J	5.16E-02	J	2.10E-01	4.95E-01	1.71E-01		340	g	N (a)		---
Benzo(a)anthracene	1 / 8	13	1.56E-01	J	1.56E-01	J	2.10E-01	4.95E-01	1.84E-01		0.15		Y	2.20E-01	1.56E-01
Benzo(a)pyrene	1 / 8	13	1.68E-01	J	1.68E-01	J	2.10E-01	4.95E-01	1.85E-01		0.015		Y	2.21E-01	1.68E-01
Benzo(b)fluoranthene	1 / 8	13	2.68E-01		2.68E-01		2.10E-01	4.95E-01	1.98E-01		0.15		Y	2.38E-01	2.38E-01
Benzo(ghi)perylene	1 / 8	13	8.82E-02	J	8.82E-02	J	2.10E-01	4.95E-01	1.75E-01		170	h	N (a)		---
Benzo(k)fluoranthene	1 / 8	13	9.72E-02	J	9.72E-02	J	2.10E-01	4.95E-01	1.76E-01		1.5		N (a)		---
Chrysene	1 / 8	13	1.90E-01	J	1.90E-01	J	2.10E-01	4.95E-01	1.88E-01		15		N (a)		---
Fluoranthene	1 / 8	13	4.01E-01		4.01E-01		2.10E-01	4.95E-01	2.14E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 8	13	9.14E-02	J	9.14E-02	J	2.10E-01	4.95E-01	1.75E-01		0.15		N (a)		---
Phenanthrene	1 / 8	13	1.07E-01	J	1.07E-01	J	2.10E-01	4.95E-01	1.77E-01		170	h	N (a)		---
Pyrene	1 / 8	13	2.73E-01		2.73E-01		2.10E-01	4.95E-01	1.98E-01		170		N (a)		---

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.

Table 2-4

Statistical Summary and Selection of COPCs in Surface Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL software (U.S. Environmental Protection Agency (EPA), 2011, ProUCL Version 4.1.01, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on acenaphthene.
[h] RBSC based on pyrene.

Table 2-5

Statistical Summary and Selection of COPCs in Subsurface Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	4.87E+03		1.14E+04		1.20E+01	2.70E+01	8.28E+03	1.55E+04	7.70E+03	N (b)
Antimony	5 / 8	63	5.00E-01	J	2.26E+00	JU	3.50E+00	1.20E+01	2.11E+00	9.30E+00	3.10E+00	N (a)
Arsenic	8 / 8	100	5.00E+00		3.27E+01		4.70E-01	1.60E+00	1.69E+01	3.65E+01	3.90E-01	N (b)
Barium	8 / 8	100	4.12E+01		1.13E+02		1.20E+01	2.70E+01	7.24E+01	8.26E+02	1.50E+03	N (a)
Beryllium	8 / 8	100	4.00E-01		1.50E+00		2.90E-01	6.70E-01	7.05E-01	1.00E+00	1.60E+01	N (a)
Cadmium	6 / 8	75	1.40E-01	J	2.10E-01	J	2.30E-01	4.00E+00	4.21E-01	NA	7.00E+00	N (a)
Calcium	8 / 8	100	3.20E+03		5.28E+04		3.00E+02	6.70E+02	3.52E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	7.70E+00		1.49E+01	J	1.20E+00	2.60E+00	1.17E+01	2.90E+01	2.90E-01	N (b)
Cobalt	8 / 8	100	5.80E+00		1.22E+01		2.90E+00	6.70E+00	7.43E+00	1.16E+02	2.30E+00	N (b)
Copper	8 / 8	100	1.50E+01		2.65E+01		1.50E+00	3.40E+00	1.91E+01	5.62E+01	3.10E+02	N (a)
Iron	8 / 8	100	1.12E+04		6.78E+04		5.80E+00	2.00E+01	2.50E+04	2.34E+05	5.50E+03	N (b)
Lead	8 / 8	100	3.40E+00	J	1.16E+01	JJ	5.90E+00	2.00E+01	8.44E+00	4.86E+01	4.00E+02	N (a)
Magnesium	8 / 8	100	6.10E+02		1.75E+04		2.90E+02	6.70E+02	1.19E+04	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	8.17E+01		1.27E+03		1.80E+00	8.90E+00	4.43E+02	3.51E+03	1.80E+02	N (b)
Mercury	7 / 8	88	1.40E-02	J	3.70E-02	J	9.00E-02	2.20E-01	3.44E-02	8.50E-02	2.30E+00	N (a)
Nickel	8 / 8	100	1.34E+01		3.19E+01		2.30E+00	5.40E+00	1.87E+01	5.51E+01	1.50E+02	N (a)
Potassium	8 / 8	100	1.29E+03		2.11E+03		5.80E+02	1.30E+03	1.64E+03	3.39E+03	Nutrient	N (c)
Selenium	8 / 8	100	6.60E-01	J	2.20E+00	J	5.90E+00	2.00E+01	1.31E+00	2.00E+00	3.90E+01	N (a)
Sodium	8 / 8	100	2.24E+02	J	6.40E+02	J	5.80E+02	1.30E+03	3.69E+02	NA	Nutrient	N (c)
Thallium	2 / 8	25	5.00E-01	J	2.90E+00		5.80E-01	6.50E+00	1.14E+00	1.30E+00	7.80E-02	Y
Vanadium	7 / 7	100	1.33E+01		2.43E+01		2.90E+00	9.90E+00	1.83E+01	4.09E+01	3.90E+01	N (a)
Zinc	7 / 7	100	3.05E+01	J	5.14E+01		1.20E+00	2.70E+00	4.08E+01	3.22E+02	2.30E+03	N (a)
Explosives												
Dinitrotoluene, 2,6-	1 / 8	13	5.12E-02	J	5.12E-02	J	1.40E-01	1.80E-01	7.52E-02		7.10E-01	N (a)

Note: Exposure point concentrations (EPC) are not provided. The subsurface soil and surface soil data sets are combined for all AP1 soil pathways as "total soil" to evaluate soil exposure for future receptors. EPCs for these receptors are based on total soil. See Table 2.13.
BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
RBSC - Risk-based screening concentration.
U - Nondetect; sample results from field duplicates may combine a nondetect with a detect.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.

Table 2-5

Statistical Summary and Selection of COPCs in Subsurface Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

[c] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.

Table 2-6

Statistical Summary and Selection of COPCs in Total Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	16 / 16	100	4.76E+03		1.14E+04		1.20E+01	2.90E+01	7.99E+03	1.55E+04	7700		N (b)		---
Antimony	7 / 16	44	5.00E-01	J	2.34E+00	/UJ	3.50E+00	1.20E+01	2.46E+00	9.30E+00	3.1		N (a)		---
Arsenic	16 / 16	100	4.90E+00		4.41E+01		4.70E-01	1.60E+00	1.67E+01	3.65E+01	0.39		Y	2.28E+01	2.28E+01
Barium	16 / 16	100	3.85E+01		2.03E+02		1.20E+01	2.90E+01	8.28E+01	8.26E+02	1500		N (a)		---
Beryllium	16 / 16	100	4.00E-01		2.10E+00		2.90E-01	7.40E-01	9.47E-01	1.00E+00	16		N (a)		---
Cadmium	9 / 16	56	1.40E-01	J	4.40E-01		2.30E-01	4.00E+00	4.74E-01	NA	7		N (a)		---
Calcium	16 / 16	100	2.06E+03		5.28E+04		3.00E+02	7.40E+02	2.34E+04	5.23E+04	Nutrient		N (c)		---
Chromium	16 / 16	100	6.90E+00		1.66E+01		1.20E+00	3.00E+00	1.19E+01	2.90E+01	0.29		N (b)		---
Cobalt	16 / 16	100	4.50E+00		1.22E+01		2.90E+00	7.40E+00	6.87E+00	1.16E+02	2.3		N (b)		---
Copper	16 / 16	100	1.16E+01		1.24E+02		1.50E+00	3.70E+00	2.81E+01	5.62E+01	310		N (a)		---
Iron	16 / 16	100	1.12E+04		6.83E+04		5.80E+00	2.00E+01	2.60E+04	2.34E+05	5500		N (b)		---
Lead	16 / 16	100	3.40E+00	J	2.04E+01		5.90E+00	2.00E+01	9.72E+00	4.86E+01	400		N (a)		---
Magnesium	16 / 16	100	3.43E+02	J	1.75E+04		2.90E+02	7.40E+02	7.05E+03	1.04E+04	Nutrient		N (c)		---
Manganese	16 / 16	100	5.45E+01		1.27E+03		1.10E+00	8.90E+00	3.34E+02	3.51E+03	180		N (b)		---
Mercury	13 / 16	81	1.40E-02	J	1.50E-01		9.00E-02	2.40E-01	5.96E-02	8.50E-02	2.3		N (a)		---
Nickel	16 / 16	100	1.15E+01		3.19E+01		2.30E+00	5.90E+00	1.72E+01	5.51E+01	150		N (a)		---
Potassium	16 / 16	100	5.24E+02	J	2.11E+03		5.80E+02	1.50E+03	1.29E+03	3.39E+03	Nutrient		N (c)		---
Selenium	16 / 16	100	5.90E-01	J	2.90E+00	J	5.90E+00	2.00E+01	1.52E+00	2.00E+00	39		N (a)		---
Sodium	16 / 16	100	1.68E+02	J	6.40E+02	J	5.80E+02	1.50E+03	3.89E+02	NA	Nutrient		N (c)		---
Thallium	3 / 16	19	5.00E-01	J	3.00E+00		5.80E-01	6.50E+00	1.50E+00	1.30E+00	0.078		Y	1.47E+00	1.47E+00
Vanadium	16 / 16	100	1.07E+01		2.89E+01		2.90E+00	9.90E+00	1.95E+01	4.09E+01	39		N (a)		---
Zinc	16 / 16	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.55E+01	3.22E+02	2300		N (a)		---
Polychlorinated biphenyls (PCB)															
Aroclor 1260	2 / 16	13	1.50E-02	J	4.30E-02	J	2.10E-02	5.00E-02	1.69E-02		0.22		N (a)		---
Explosives															
Dinitrotoluene, 2,6-	4 / 16	25	5.12E-02	J	6.62E-02	JJ	1.40E-01	1.90E-01	7.59E-02		0.71		N (a)		---
Semivolatile Organic Compounds															
Acenaphthylene	1 / 16	6	5.16E-02	J	5.16E-02	J	2.00E-01	4.95E-01	1.49E-01		340	g	N (a)		---
Benzo(a)anthracene	1 / 16	6	1.56E-01	J	1.56E-01	J	2.00E-01	4.95E-01	1.56E-01		0.15		Y	1.81E-01	1.56E-01
Benzo(a)pyrene	1 / 16	6	1.68E-01	J	1.68E-01	J	2.00E-01	4.95E-01	1.56E-01		0.015		Y	1.82E-01	1.68E-01
Benzo(b)fluoranthene	1 / 16	6	2.68E-01		2.68E-01		2.00E-01	4.95E-01	1.63E-01		0.15		Y	1.91E-01	1.91E-01
Benzo(ghi)perylene	1 / 16	6	8.82E-02	J	8.82E-02	J	2.00E-01	4.95E-01	1.51E-01		170	h	N (a)		---
Benzo(k)fluoranthene	1 / 16	6	9.72E-02	J	9.72E-02	J	2.00E-01	4.95E-01	1.52E-01		1.5		N (a)		---
Chrysene	1 / 16	6	1.90E-01	J	1.90E-01	J	2.00E-01	4.95E-01	1.58E-01		15		N (a)		---
Fluoranthene	1 / 16	6	4.01E-01		4.01E-01		2.00E-01	4.95E-01	1.71E-01		230		N (a)		---
Indeno(1,2,3-cd)pyrene	1 / 16	6	9.14E-02	J	9.14E-02	J	2.00E-01	4.95E-01	1.52E-01		0.15		N (a)		---
Phenanthrene	1 / 16	6	1.07E-01	J	1.07E-01	J	2.00E-01	4.95E-01	1.53E-01		170	h	N (a)		---
Pyrene	1 / 16	6	2.73E-01		2.73E-01		2.00E-01	4.95E-01	1.63E-01		170		N (a)		---

BSC - Background screening criterion.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
VQ - Validation qualifier.

Table 2-6

Statistical Summary and Selection of COPCs in Total Soil
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based onEPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL softwarer (U.S. Environmental Protection Agency (EPA), 2011, ProUCL Version 4.1.01, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm). Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] RBSC based on acenaphthene.
[h] RBSC based on pyrene.

Table 2-7

Statistical Summary and Selection of COPCs in Overburden Groundwater
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	RBSC [b] µg/L	COPC? [c,d]	95% UCL [e] µg/L	EPC [f] µg/L	EPC mg/L
Inorganics - Unfiltered														
Aluminum	4 / 6	67	3.49E+01	J	8.89E+01	J	2.00E+01	2.40E+01	4.72E+01	1600	N (a)		---	
Arsenic	3 / 6	50	5.00E+00		9.90E+00	J	1.00E+00	1.00E+00	3.85E+00	0.045	Y	8.02E+00	8.02E+00	8.02E-03
Barium	6 / 6	100	4.01E+01	J	2.20E+02	J	1.00E+00	4.00E+00	9.96E+01	290	N (a)		---	
Calcium	6 / 6	100	1.16E+05		1.61E+05	J	5.00E+01	5.00E+01	1.35E+05	Nutrient	N (b)		---	
Chromium	1 / 6	17	1.30E+00	J	1.30E+00	J	1.00E+00	1.00E+00	1.05E+00	0.031	Y	NA	1.30E+00	1.30E-03
Cobalt	3 / 6	50	1.15E+00	J	2.10E+00	J	1.00E+00	1.00E+00	1.31E+00	0.47	Y	1.75E+00	1.75E+00	1.75E-03
Iron	4 / 6	67	6.41E+01	J	2.24E+03		2.30E+01	3.40E+01	6.07E+02	1100	Y	1.35E+03	1.35E+03	1.35E+00
Magnesium	6 / 6	100	2.68E+04	J	7.16E+04	J	5.00E+01	5.00E+01	5.28E+04	Nutrient	N (b)		---	
Manganese	6 / 6	100	5.20E+01		1.77E+03		1.00E+00	1.00E+00	5.82E+02	32	Y	1.11E+03	1.11E+03	1.11E+00
Nickel	1 / 6	17	2.40E+00	J	2.40E+00	J	1.00E+00	1.00E+00	1.23E+00	30	N (a)		---	
Potassium	6 / 6	100	7.61E+02	J	1.11E+04		5.00E+01	5.00E+01	4.91E+03	Nutrient	N (b)		---	
Sodium	6 / 6	100	1.98E+04		1.54E+05		7.50E+02	3.40E+03	6.04E+04	Nutrient	N (b)		---	
Vanadium	2 / 6	33	2.10E+00	J	2.10E+00	J	1.00E+00	1.00E+00	1.37E+00	7.8	N (a)		---	
Zinc	5 / 6	83	7.60E+00	J	1.84E+01	J	1.00E+00	1.00E+00	1.05E+01	470	N (a)		---	
Explosives														
Nitrotoluene, 2-	1 / 6	17	1.80E-01	J	1.80E-01	J	7.80E-02	1.60E-01	1.23E-01	0.27	N (a)		---	
Volatile Organics														
Acetone	1 / 6	17	1.76E+01	J	1.76E+01	J	1.00E+01	1.00E+01	1.13E+01	1200	N (a)		---	
Chloromethane	1 / 6	17	1.60E+00	J	1.60E+00	J	5.00E-01	5.00E-01	6.83E-01	19	N (a)		---	
Dichloroethane, 1,1-	1 / 6	17	1.65E+00		1.65E+00		2.50E-01	2.50E-01	4.83E-01	2.4	N (a)		---	
Trichloroethane, 1,1,1-	1 / 6	17	2.65E-01	J	2.65E-01	J	2.00E-01	2.00E-01	2.11E-01	750	N (a)		---	
General Chemistry														
Chloride	3 / 3	100	1.75E+03	J	2.70E+04		1.00E+03	5.00E+03	1.33E+04	Nutrient	N (b)		---	
Nitrate-Nitrite	3 / 3	100	5.10E+01	J	5.30E+02		5.00E+01	5.00E+01	3.34E+02	1,000,000 [f]	N (a)		---	
Sulfate	3 / 3	100	1.65E+05	J	5.38E+05		2.00E+03	1.00E+04	3.36E+05	250,000 [g]	Y	NA	5.38E+05	5.38E+02

RBSC - Risk-based screening concentration.
COPC - Chemical of potential concern.
µg/L - Micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) tap water values and based on a risk level of 1.0E-06 and a hazard index of 0.1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.
[d] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.1.01 (U.S. Environmental Protection Agency (EPA), 2011, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm). Calculated only for COPC.
[e] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[f] Because no Regional Screening Level exists for nitrite-nitrate, 0.1 X the nitrite-nitrate MCL (of 10,000 mg/L) is used for screening.
[g] US Environmental Protection Agency (EPA), 2012, *2012 Edition of the Drinking Water Standards and Health Advisories* , Office of Water, April, EPA 822-R-12-001.

Table 2-8

Statistical Summary and Selection of COPCs in Sediment
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	RBSC [a] mg/kg	COPC? [b,c]	EPC [d] mg/kg
Inorganics												
Aluminum	3 / 3	100	2.48E+03	J	7.75E+03		1.80E+01	3.31E+01	4.61E+03	7.70E+04	N (a)	---
Antimony	1 / 3	33	5.40E-01	J	5.40E-01	J	1.50E+00	5.40E+00	7.13E-01	3.10E+01	N (a)	---
Arsenic	3 / 3	100	3.70E+00		6.40E+00		7.20E-01	1.70E+00	5.33E+00	3.90E-01	Y	6.40E+00
Barium	2 / 3	67	2.66E+01		4.78E+01		1.80E+01	3.31E+01	2.99E+01	1.50E+04	N (a)	---
Beryllium	1 / 3	33	2.60E-01	J	2.60E-01	J	4.50E-01	8.30E-01	3.51E-01	1.60E+02	N (a)	---
Cadmium	1 / 3	33	3.00E-01	J	3.00E-01	J	3.05E-01	3.60E-01	2.06E-01	7.00E+01	N (a)	---
Calcium	3 / 3	100	5.09E+03		1.81E+04		4.50E+02	8.28E+02	1.09E+04	Nutrient	N (b)	---
Chromium	3 / 3	100	5.40E+00		1.08E+01		7.55E-01	9.00E-01	7.53E+00	2.90E-01	Y	1.08E+01
Cobalt	1 / 3	33	4.10E+00	J	4.10E+00	J	4.50E+00	8.30E+00	4.01E+00	2.30E+01	N (a)	---
Copper	3 / 3	100	1.44E+01		1.26E+02		2.30E+00	4.10E+00	7.15E+01	3.10E+03	N (a)	---
Iron	3 / 3	100	6.71E+03		1.30E+04	J	9.00E+00	1.66E+01	1.08E+04	5.50E+04	N (a)	---
Lead	3 / 3	100	6.70E+00		1.19E+01		4.55E-01	9.00E+00	9.10E+00	4.00E+02	N (a)	---
Magnesium	3 / 3	100	2.57E+03		5.67E+03		4.50E+02	8.28E+02	4.20E+03	Nutrient	N (b)	---
Manganese	3 / 3	100	1.30E+02	J	3.18E+02		1.40E+00	2.50E+00	1.96E+02	1.80E+03	N (a)	---
Mercury	1 / 3	33	2.70E-02	J	2.70E-02	J	1.40E-01	1.70E-01	6.23E-02	2.30E+01	N (a)	---
Nickel	3 / 3	100	6.55E+00		1.25E+01		3.60E+00	6.60E+00	9.85E+00	1.50E+03	N (a)	---
Potassium	2 / 3	67	3.37E+02	J	1.27E+03		7.59E+02	1.80E+03	6.62E+02	Nutrient	N (b)	---
Selenium	1 / 2	50	1.10E+00		1.10E+00		7.55E-01	8.30E-01	7.39E-01	3.90E+02	N (a)	---
Vanadium	3 / 3	100	6.55E+00	/U	1.93E+01		4.50E+00	8.30E+00	1.24E+01	3.90E+02	N (a)	---
Zinc	3 / 3	100	2.63E+01		5.28E+01	J	1.80E+00	3.30E+00	4.25E+01	2.30E+04	N (a)	---
Semivolatiles Organic Compounds												
Benzo(a)anthracene	1 / 3	33	1.43E-01	J	1.43E-01	J	3.10E-01	5.50E-01	2.23E-01	1.50E-01	N (a)	---
Benzo(a)pyrene	1 / 3	33	1.58E-01	J	1.58E-01	J	3.10E-01	5.50E-01	2.28E-01	1.50E-02	Y	1.58E-01
Benzo(b)fluoranthene	1 / 3	33	2.40E-01	J	2.40E-01	J	3.10E-01	5.50E-01	2.55E-01	1.50E-01	Y	2.40E-01
Benzo(ghi)perylene	1 / 3	33	1.01E-01	J	1.01E-01	J	3.10E-01	5.50E-01	2.09E-01	1.70E+02 e	N (a)	---
Benzo(k)fluoranthene	1 / 3	33	8.05E-02	J	8.05E-02	J	3.10E-01	5.50E-01	2.02E-01	1.50E+00	N (a)	---
Chrysene	1 / 3	33	1.59E-01	J	1.59E-01	J	3.10E-01	5.50E-01	2.28E-01	1.50E+01	N (a)	---
Fluoranthene	1 / 3	33	2.53E-01	J	2.53E-01	J	3.10E-01	5.50E-01	2.59E-01	2.30E+03	N (a)	---
Indeno(1,2,3-cd)pyrene	1 / 3	33	1.11E-01	J	1.11E-01	J	3.10E-01	5.50E-01	2.12E-01	1.50E-01	N (a)	---
Pyrene	1 / 3	33	2.06E-01	J	2.06E-01	J	3.10E-01	5.50E-01	2.44E-01	1.70E+02	N (a)	---

RBSC - Risk-based screening concentration.
COPC - Chemical of potential concern.
mg/kg - Milligrams per kilogram.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

Table 2-8

Statistical Summary and Selection of COPCs in Sediment
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil and based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.
[d] Exposure-point concentration (EPC) used in risk assessment equal to maximum detected concentration.
[e] RBSC based on pyrene.

Table 2-9

Statistical Summary and Selection of COPCs in Surface Water
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of values, µg/L						Arithmetic		
	Detection	Percent	Detected Concentration				Reporting Limits		Mean	RBSC [a]	
Chemical	Frequency	hits	Minimum	VQ	Maximum	VQ	Minimum	Maximum	µg/L	µg/L	COPC? [b,c]
Metals											
Calcium	3 / 3	100	24450		27900		5000	5000	26683	Nutrient	N (b)
Magnesium	3 / 3	100	8990		9470		5000	5000	9290	Nutrient	N (b)
Manganese	3 / 3	100	41.65	J	195		15	15	130	320	N (a)
Sodium	2 / 3	67	9740		10350		5000	5000	7530	Nutrient	N (b)

RBSC - Risk-based screening concentration.
COPC - Chemical of potential concern.
µg/L - Micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) tap water values and based on a risk level of 1.0E-06 and a hazard index of 1.
[b] N - Chemical is not chosen as a COPC:
(a) - Maximum detected concentration is less than the RBSC.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPC.

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Groundskeeper – Current			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation[a]
Subsurface Soil	Not Quantified[b]		
Groundwater	Not Quantified[c]		
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Groundskeeper – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Indoor Worker – Future[e]			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact[a]
	Dust Emissions; Volatilization	Indoor Air	Inhalation[a]
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Construction Worker – Current/Future			
Total Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	Not Quantified[b]		
Surface Water	None	Surface Water	Dermal Contact
	Volatilization from Water	Ambient Air	Inhalation[a]
Sediment	None	Sediment	Incidental Ingestion
			Dermal Contact
On-Site Resident – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Wind Erosion	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	None	Tap Water	Ingestion
			Dermal Contact
	Volatilization from Water	Indoor Air	Inhalation
Surface Water	None	Surface Water	Dermal Contact
	Volatilization from Water	Ambient Air	Inhalation[a]
Sediment	None	Sediment	Incidental Ingestion
			Dermal Contact

Table 3-1

Receptor/Exposure Scenarios
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Hunter – Current/Future			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions, Volatilization	Ambient Air	Inhalation[a]
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[e]		
Surface Water	Not Quantified[b]		
Sediment	Not Quantified[b]		
Hunter's Child – Current/Future			
Surface Soil	Not Quantified[c]		
	Not Quantified[c]		
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[c]		
Surface Water	Not Quantified[c]		
Sediment	Not Quantified[c]		

[a] Although theoretically complete, this pathway is not quantified as explained in text.

[b] Although contact with this medium is possible, exposure would be sporadic, rather than continuous or predictable. Such exposures do not lend themselves to evaluation under the chronic toxicity paradigm used in a baseline risk assessment.

[c] There is no plausible pathway for exposure.

[d] Total soil represents a mixture of surface and subsurface soil. This is assumed for future scenarios where excavation and regrading is assumed to take place.

[e] Even though the mixing of surface and subsurface soil described in footnote "d" might otherwise be applicable, this receptor was selected primarily to evaluate exposure to indoor air resulting from subsurface soil contamination. Surface soil was used for direct contact exposure to avoid potential "double counting" of contaminants in subsurface soil (refer to Section 3.1.3.2 of text).

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
General Variables Used in All Intake Models					
Body weight (BW), kg	70[a]	70[a]	Child: 15[a] Adult: 70[a]	70[a]	Child: 15[a] Adult: 70[a]
Averaging time, noncancer (AT), days[b]	9125	183	Child: 2190 Adult: 8760	9125	Child: 2190 Adult: 10950
Averaging time, cancer (AT), days[b]	25550	25550	25550	25550	25550
Inhalation of VOCs and Resuspended Dust from Surface Soil, Total Soil or Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	1[c]	1[c]	1[c]	NA	NA
Inhalation rate (IR_a), m^3/day	20[d]	20[d]	Child: 10[e] Adult: 20[d]	NA	NA
Exposure frequency (EF), days/year	250[d]	250[c]	350[a]	NA	NA
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	NA	NA
Inhalation of VOCs in Indoor Air from Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	NA	NA	1[c]	1[c]	NA
Inhalation rate (IR_a), m^3/day	NA	NA	Child: 10[e] Adult: 20[d]	20[d]	NA
Exposure frequency (EF), days/year	NA	NA	350[a]	250[a]	NA
Exposure duration (ED), years	NA	NA	Child: 6[a] Adult: 24[a]	25[a]	NA
Incidental Ingestion of Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	0.9[f]	1[c]	1[c]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Soil incidental ingestion rate (IR_{so}), mg/day	100[a]	330[a]	Child: 200[a] Adult: 100[a]	50[a]	Child: NA Adult: 100[a]
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	250[a]	14[d]
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	25[a]	30[a]
Dermal Contact with Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	1[c]	NA	1[c]
Body surface area exposed to soil (SA_{so}), cm^2	3,300[g]	3,300[g]	Child: 2,800[g] Adult: 5,700[g]	NA	Child: NA Adult: 3,300[c]
Soil-to-skin adherence factor (AF_{so}), mg/cm^2	0.2[g]	0.3[g]	Child: 0.2[g] Adult: 0.07[g]	NA	0.2[c]
Dermal absorption factor (ABS), unitless	csv	csv	csv	NA	csv
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	NA	14[c]
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	NA	30[a]
Inhalation of VOCs from Groundwater					
Exposure time (ET), hours/day	NA	NA	24[h]	NA	NA
Inhalation rate (IR_a), m^3/hour	NA	NA	Child: 0.416[e] Adult: 0.833[e]	NA	NA
Exposure frequency (EF), days/year	250[d]	NA	350[a]	250[a]	NA

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Drinking Water Ingestion of Groundwater					
Fraction exposed to contaminated medium (Fl_{gw}), unitless	1[c]	NA	1[c]	1[c]	NA
Drinking water ingestion rate (IR_{gw}), L/day	1[d]	NA	Child: 1[e] Adult: 2[d]	1[d]	NA
Exposure frequency (EF), days/year	250[d]	NA	350[a]	250[a]	NA
Dermal Contact with Groundwater					
Fraction exposed to contaminated medium (Fl_{gw}), unitless	1[c]	NA	1[c]	1[c]	NA
Body surface area exposed to water (SA_{gw}), cm^2	3,300[c]	NA	Child: 6,600[i] Adult: 20,000[i]	3,300[i]	NA
Permeability coefficient (PC), cm/hour	csv	NA	csv	csv	NA
Exposure time (ET_{gw}), hours/day	1[c]	NA	Child: 0.333[i] Adult: 0.2[i]	1[c]	NA
Exposure frequency (EF), days/year	250[d]	NA	350[d]	250[a]	NA
Incidental Ingestion of Sediment					
Fraction exposed to contaminated medium (Fl_{sd}), unitless	NA	1[c]	0.1[f]	NA	NA
Sediment incidental ingestion rate (IR_{sd}), mg/day	NA	330[a]	Child: 200[a] Adult: 100[a]	NA	NA
Exposure frequency (EF), days/year	NA	250[c]	350[a]	NA	NA
Exposure duration (ED), years	NA	0.5[c]	Child: 6[a] Adult: 24[a]	NA	NA

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Dermal Contact with Sediment					
Fraction exposed to contaminated medium (FI_{sd}), unitless	NA	1[c]	0.1[f]	NA	NA
Body surface area exposed to sediment (SA_{sd}), cm^2	NA	3,300[g]	Child: 2,800[g] Adult: 5,700[g]	NA	NA
Sediment-to-skin adherence factor (AF_{sd}), mg/cm^2	NA	0.3[g]	Child: 0.2[g] Adult: 0.07[g]	NA	NA
Dermal absorption factor (ABS), unitless	NA	csv	csv	NA	NA
Exposure frequency (EF), days/year	NA	250[c]	52[c]	NA	NA
Exposure duration (ED), years	NA	0.5[c]	Child: 6[a] Adult: 24[a]	NA	NA
Dermal Contact with Surface Water					
Body surface area exposed to surface water (SA_{sw}), cm^2	NA	3,300[j]	Child: 2,800[j] Adult: 7,000[c]	NA	NA
Permeability coefficient (PC), cm/hour	NA	csv	csv	NA	NA
Exposure time (ET_{sw}), hour/day	NA	4[c]	3[c]	NA	NA
Exposure frequency (EF), days/year	NA	250[c]	52[c]	NA	NA
Exposure duration (ED), years	NA	0.5[c]	Child: 6[a] Adult: 24[a]	NA	NA
Venison Consumption					
Venison ingestion rate (IR_v), kg/day	NA	NA	NA	NA	Child: 0.005[c] Adult: 0.013[c]
Exposure frequency (EF), days/year	NA	NA	NA	NA	350[a]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Exposure duration (ED), years	NA	NA	NA	NA	Child: 6[a] Adult: 30[c]

[a] U.S. Environmental Protection Agency (EPA), 2002, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

[b] For noncancer evaluation, calculated as the product of ED (years) x 365 days/year; for cancer evaluation, calculated as the product of 70 years (assumed human lifetime) x 365 days/year. Source: U.S. Environmental Protection Agency (EPA), 1989a, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

[c] Assumed; see text.

[d] U.S. Environmental Protection Agency (EPA), 1991, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.603.

[e] U.S. Environmental Protection Agency (EPA), 2004a, *User's Guide and Background Technical Document for Region 9 Preliminary Remediation Goals (PRG) Table*, Region 9, San Francisco, California, October, <http://www.epa.gov/region09/waste/sfund /prg/files/04usersguide.pdf>.

[f] It is assumed that on days when the resident is visiting the ditches and is exposed to sediment that half of the daily exposure via dermal contact and ingestion are associated with ditch sediment (sediment FI=0.5) and half of the exposure is associated with soil (soil FI=0.5). The resident is assumed to be exposed to soil 350 days/year and to sediment 52 days/year. The FI values of 0.1 for sediment and 0.9 for soil are weighted average daily values as described in Section 3.1.3.4 of the text.

[g] U.S. Environmental Protection Agency (EPA), 2004b, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)*, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

[h] The *Exposure Factors Handbook* (see reference i) indicates that the 90th percentile for the amount of time spent at a residence is more than 23 hours per day.

[i] U.S. Environmental Protection Agency (EPA), 1997, *Exposure Factors Handbook*, Final, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.

[j] Value for dermal soil exposure (EPA, 2004b) was selected as appropriate for exposure to this medium by this receptor; refer to text for detail.

csv – Chemical-specific value.
NA – Pathway not applicable for receptor.

Table 3-3

Physical Properties of COPCs[a]
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical of Potential Concern	Soil-to-forage Biotransfer Factor B_p (unitless)	Biotransfer Factor for Beef B_b (days/kg)	Biotransfer Factor for Venison B_v (unitless)	Diffusivity In Air (D_i) (cm^2/second)	Soil Organic Carbon-Water Partition Coefficient K_{oc} (cm^3/g)	log K_{ow}	Absorption Fraction ABS (unitless)	Permeability Coefficient K_p (cm/hour)	*tau* (hour/event)	*t** (hour)	Fraction Absorbed from Water FA (unitless)	B (unitless)	Molecular Weight (g/mole)	Henry's Law Constant (atm-m^3/mole)
Metals														
Arsenic	NA	NA	NA	NA	2.90E+01	NA	0.03	1.00E-03	NA	NA	NA	NA	74.92	NA
Chromium III	NA	NA	NA	NA	1.80E+06	NA	NA	1.00E-03	NA	NA	NA	NA	52	NA
Chromium VI	NA	NA	NA	NA	1.90E+01	NA	NA	2.00E-03	NA	NA	NA	NA	52	NA
Chromium, Total	NA	NA	NA	NA	NA	NA	NA	1.00E-03	NA	NA	NA	NA	52	NA
Cobalt	NA	NA	NA	NA	4.50E+01	NA	NA	4.00E-04	NA	NA	NA	NA	58.93	NA
Iron	NA	NA	NA	NA	2.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	55.845	NA
Manganese	NA	NA	NA	NA	6.50E+01	NA	NA	1.00E-03	NA	NA	NA	NA	54.94	NA
Thallium	4.00E-04	4.00E-02	2.40E-04	NA	7.10E+01	NA	NA	1.00E-03	NA	NA	NA	NA	204.38	NA
Semivolatile Organic Compounds														
Benzo(a)anthracene	NA	NA	NA	5.10E-02	3.98E+05	5.66E+00	0.13	4.70E-01	2.03	8.53	1	2.8	228.3	3.34E-06
Benzo(a)pyrene	NA	NA	NA	4.30E-02	1.02E+06	6.10E+00	0.13	7.00E-01	2.69	11.67	1	4.3	252.3	4.57E-07
Benzo(b)fluoranthene	NA	NA	NA	2.26E-02	1.23E+06	6.12E+00	0.13	7.00E-01	2.77	12.03	1	4.3	252.3	6.57E-07
Dibenz(a,h)anthracene	NA	NA	NA	2.02E-02	4.74E+05	6.75E+00	0.13	1.50E+00	3.88	17.57	0.6	9.7	278.4	1.41E-07
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.90E-02	3.47E+06	6.58E+00	0.13	1.00E+00	3.78	16.83	0.6	6.7	276.3	1.60E-06
General Chemistry														
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

tau - Lag time associated with rate at which chemical crosses stratum corneum per event.
t* - Time for absorption across the stratum corneum to reach steady state ; equals 2.4 times tau.
B - Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.
kg - Kilogram.
g - Gram.
atm-m^3 - Atmospheres per cubic meter.

[a] See Appendix C for references for these values.

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical of Potential Concern	GAF	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Unit Risk (µg/m^3) $^{-1}$	Inhalation Slope Factor (mg/kg-day) $^{-1}$
Metals							
Arsenic	1	A	1.50E+00	1.50E+00	A	4.30E-03	1.50E+01
Chromium III	0.013	D	NA	NA	D	NA	NA
Chromium VI	0.025	D	NA	NA	A	1.20E-02	4.20E+01
Chromium, Total	0.013	D	NA	NA	A	1.20E-02	4.20E+01
Cobalt	1	ND	NA	NA	B	9.00E-04	3.20E+01
Iron	1	ND	NA	NA	ND	NA	NA
Manganese	0.04	D	NA	NA	D	NA	NA
Thallium	1	D	NA	NA	D	NA	NA
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Benzo(a)pyrene	1	B2	7.30E+00	7.30E+00	B2	8.80E-04	3.10E+00
Benzo(b)fluoranthene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Dibenz(a,h)anthracene	1	B2	7.30E+00	7.30E+00	B2	8.80E-04	3.10E+00
Indeno(1,2,3-cd)pyrene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
General Chemistry							
Sulfate	NA	NA	NA	NA	NA	NA	NA

Table 4-1

Summary of Toxicity Assessment [a]
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Oral		Dermal	Reference	Inhalation	
Chemical of Potential Concern	GAF	Reference Dose mg/kg-day	Target Organs	Reference Dose mg/kg-day	Concentration mg/m^3	Reference Dose mg/kg-day	Target Organs
Metals							
Arsenic	1	3.00E-04	S	3.00E-04	NA	NA	NA
Chromium III	0.013	1.50E+00	ND	2.00E-02	NA	NA	NA
Chromium VI	0.025	3.00E-03	ND	7.50E-05	1.00E-04	2.90E-05	Lung
Chromium, Total	0.013	2.10E-02	ND	2.70E-04	7.00E-04	2.03E-04	Lung
Cobalt	1	3.00E-04	Thyroid	3.00E-04	6.00E-06	1.70E-06	RT
Iron	1	7.00E-01	GI	NA	ND	NA	NA
Manganese	0.04	4.70E-02	CNS	1.90E-03	5.00E-05	1.40E-05	CNS
Thallium	1	6.50E-05	S,L	6.50E-05	ND	NA	NA
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	ND	NA	NA	ND	NA	NA
Benzo(a)pyrene	1	ND	NA	NA	ND	NA	NA
Benzo(b)fluoranthene	1	ND	NA	NA	ND	NA	NA
Dibenz(a,h)anthracene	1	ND	NA	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	1	ND	NA	NA	ND	NA	NA
General Chemistry							
Sulfate	NA	NA	NA	NA	NA	NA	NA

mg/kg-day - Milligram per kilogram - day.
mg/m^3 - Milligram per cubic meter.
GAF - Gastrointestinal absorption factor.
NA - Not available or not applicable.
ND - No data.
[a] See Appendix C which provides references for these values.

Target Organs: S - skin; GI - gastrointestinal; CNS - central nervous system; L - liver;

Weight of Evidence (WOE) EPA Group:
A - Carcinogenic to humans.
B - Likely to be carcinogenic to humans (includes both the former B1 and B2 probable human carcinogens as classified on IRIS).
C - Suggested evidence of carcinogenic potential.
D - Inadequate evidence to assess carcinogenic potential.

Table 5-1

Summary of Risk for All Receptors
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance, Works, Sandusky, Ohio

	Groundskeeper [a]		Construction Worker		Indoor Worker		Resident			Hunter		Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Exposure Media													
Surface Soil	2.21E-05	0.15	NE	NE	7.82E-06	0.067	NE	NE	NE	1.28E-06	0.0086	NA	0.0000014
Total Soil	1.76E-05	0.11	1.07E-06	0.3	NE	NE	5.63E-05	0.13	1.2	NE	NE	NE	NE
Sediment	NE	NE	2.84E-07	0.1	NE	NE	1.74E-06	0.003	0.03	NE	NE	NE	NE
Surface Water	NE	NE	NA	NA	NE	NE	NA	NA	NA	NE	NE	NE	NE
Groundwater	4.22E-05	0.59	NE	NE	4.22E-05	0.59	1.79E-04	1.6	3.8	NE	NE	NE	NE
Total ILCR or HI	**6.E-05**	**0.7**	**1.E-06**	**0.4**	**5.E-05**	**0.7**	**2.E-04**	**2**	**5**	**1.E-06**	**0.009**	**NA**	**0.000001**

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.

Note:
[a] Total ILCR and total HI values for the groundskeeper reflect the respective totals for the future groundskeeper. The total ILCR and HI values for the current groundskeeper are simply those shown for surface soil. The rounded current groundskeeper ILCR is 2E-5 and the rounded HI is 0.2

Table 5-2

Summary of Risk for Receptors Excluding Exposure to Groundwater[a]
Ash Pit 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Future Groundskeeper [a]		Indoor Worker		Resident		
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI
Exposure Media							
Surface Soil	2.21E-05	0.15	7.82E-06	0.067	NE	NE	NE
Total Soil	1.76E-05	0.11	NE	NE	5.63E-05	0.13	1.2
Sediment	NE	NE	NE	NE	1.74E-06	0.003	0.03
Surface Water	NE	NE	NE	NE	NA	NA	NA
Total ILCR or HI	**2.E-05**	**0.1**	**8.E-06**	**0.1**	**6.E-05**	**0.1**	**1**
Total ILCR Excluding Arsenic in Soil[b]	**9.E-07**	**--**	**3.E-07**	**--**	**5.E-06**	**--**	**--**

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.

Notes:
[a] The receptors are those evaluated for groundwater exposure as presented in Table 5-1. Groundwater exposure is excluded from this table because the risks and hazards are associated with gorundwater exposure (Table 5-1) are resultant from the presence of inorganics that are evidently not related to former PBOW operations. Notably these are arsenic (cancer and noncancer) and manganese (noncancer).
[b] Even without the contribution of groundwater exposure, the total ILCR values for the future groundskeeper and the resident exceed the PBOW ILCR goal of 1E-5. The risk driving COPC is arsenic, which was shown to be present in AP3 soil at concentrations that are not statistically greater than in the PBOW background data set and are thus interpreted as not being site related. If the contribution of arsenic in soil is excluded from the cancer risk calculations for these receptors, the resulting ILCR is less than the PBOW ILCR goal.

FIGURES

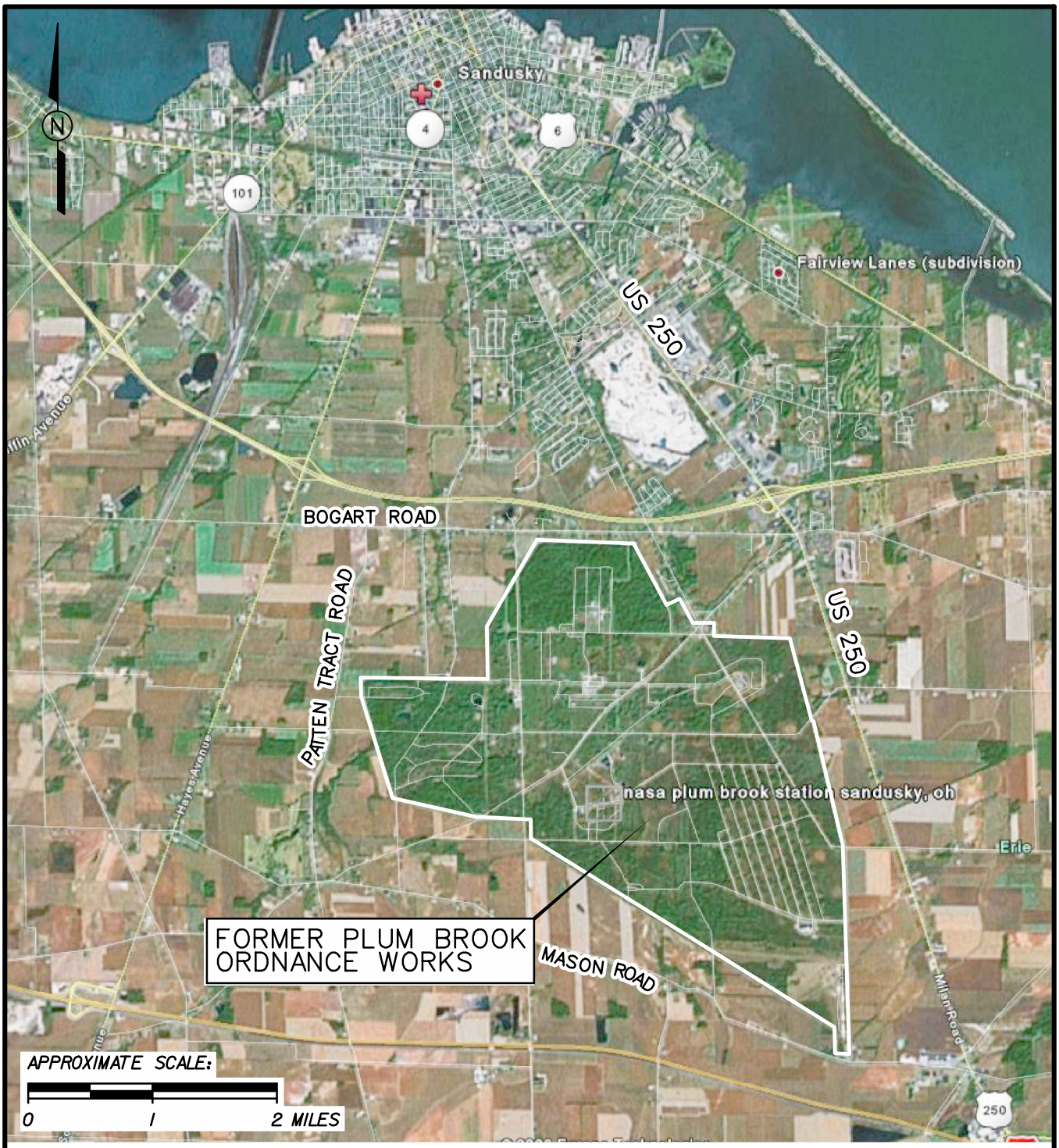

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 3 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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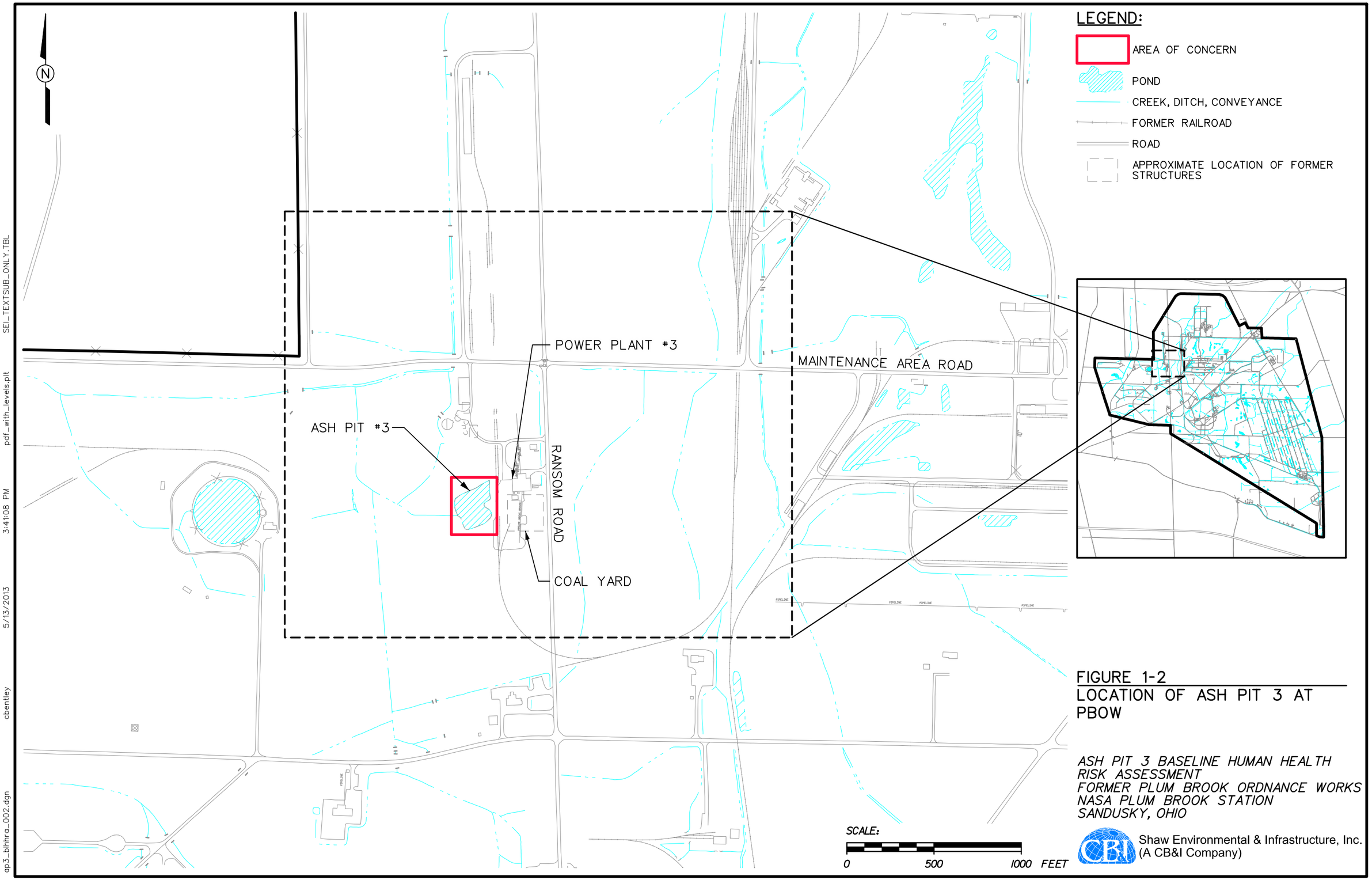

FIGURE 1-2
LOCATION OF ASH PIT 3 AT PBOW

ASH PIT 3 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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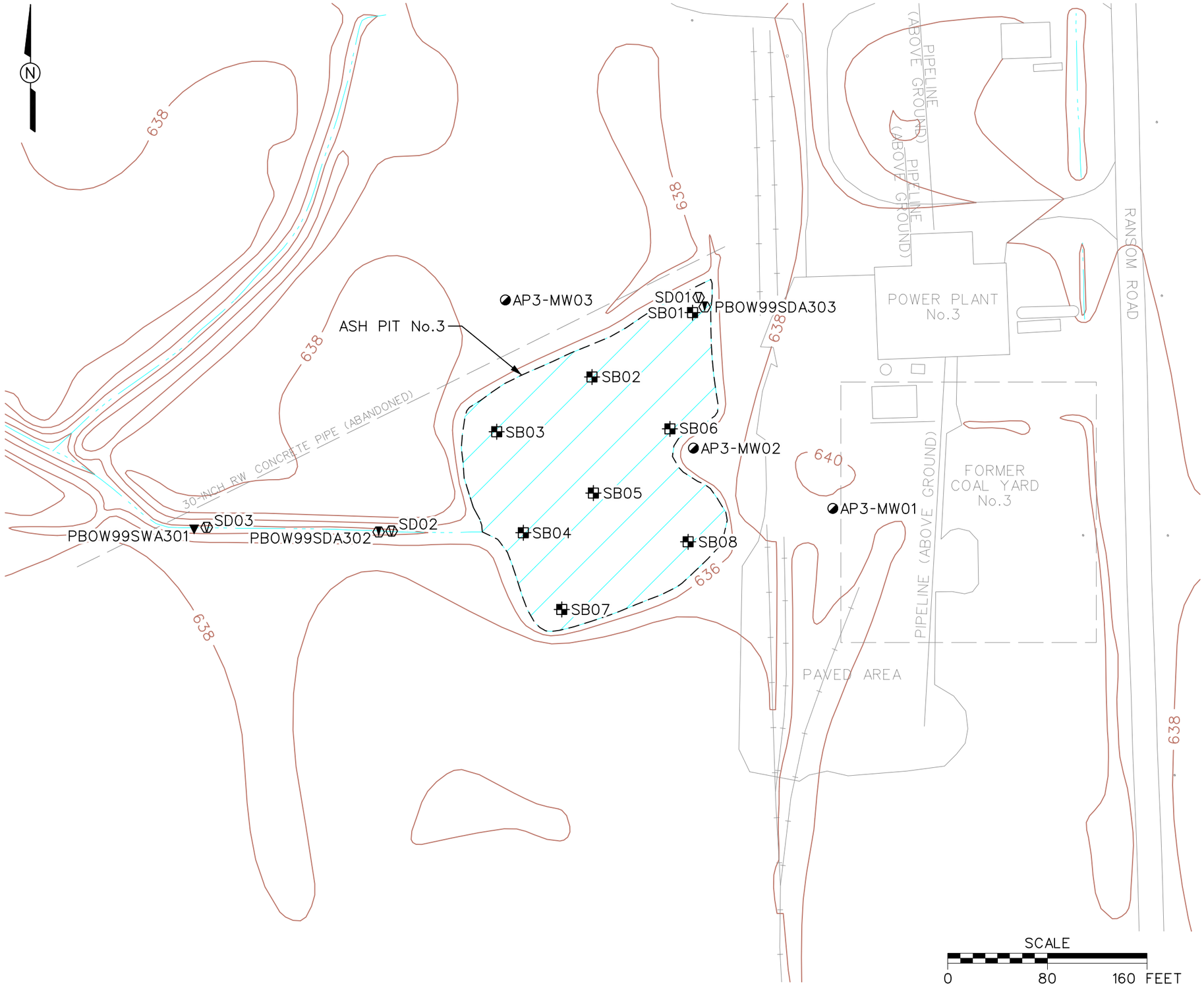

LEGEND:

- OVERBURDEN MONITORING WELL
- SOIL BORING
- SURFACE WATER/SEDIMENT SAMPLE
- SI SEDIMENT/SURFACE WATER SAMPLE (USACE, 2000)
- SI SURFACE WATER SAMPLE (USACE, 2000)
- UTILITY POLE
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)

NOTES:

1. SITE INVESTIGATION (SI) SAMPLES COLLECTED IN 1999 (USACE, 2000, LIMITED SITE INVESTIGATION, FINAL REPORT, FOR THE FORMER PLUM BROOK ORDNANCE WORKS ASH PITS NO. 1 AND 3, SANDUSKY, OHIO, JULY).
2. SOIL SAMPLES OTHER THAN THE SI SAMPLES WERE COLLECTED IN 2008 AND 2009 AS PART OF THE REMEDIAL INVESTIGATION.
3. GROUNDWATER SAMPLES WERE COLLECTED IN 2011 AND 2012 AS PART OF THE REMEDIAL INVESTIGATION.
4. FORMER COAL YARD NO.3 PERIMETER IS BASED ON HISTORICAL AERIAL PHOTOGRAPHY AND IS APPROXIMATE.

FIGURE 2-1
ASH PIT 3 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 3 BASELINE HUMAN HEALTH RISK ASSESSMENT
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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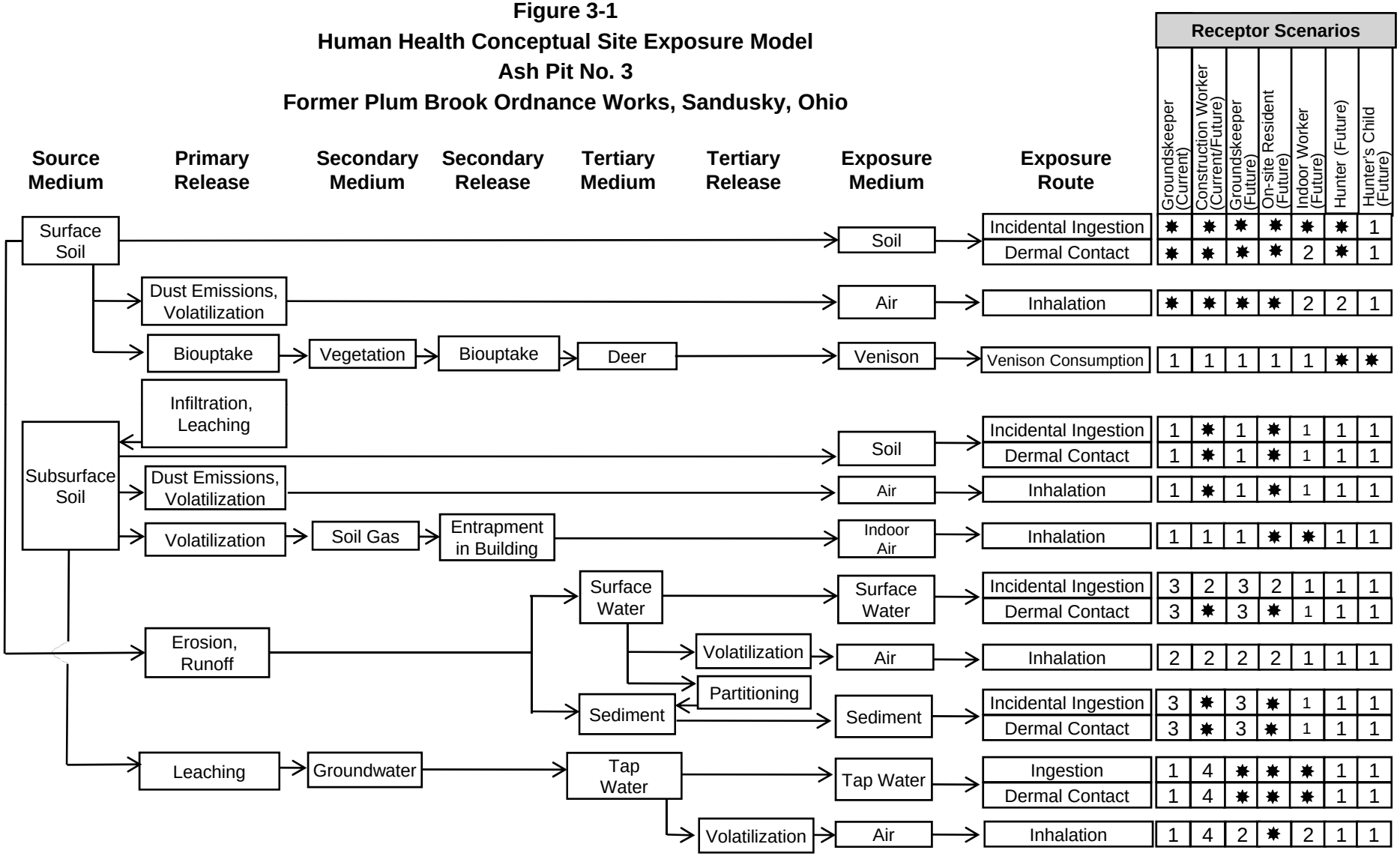
Figure 3-1
Human Health Conceptual Site Exposure Model
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio



✸= Complete exposure route quantified in the risk assessment.
1 = There is no plausible pathway for exposure to this medium.
2 = Although theoretically complete, this pathway is not quantified as explained in text.
3 = Contact with this medium, although plausible, is not part of this receptor's normal or expected activities; therefore contact would be sporadic and is not quantified.
4 = For current use there is no plausible exposure pathway. For future use, the pathway is potentially complete, but is not quantified as explained in the text.

APPENDIX A

ANALYTICAL RESULTS EVALUATED IN THE BASELINE HUMAN HEALTH RISK ASSESSMENT

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB01					ASH PIT 3-SB02					ASH PIT 3-SB03				
SAMPLE_NO		AP0032					AP0036					AP0039				
SAMPLE_DATE		19-Aug-09					19-Aug-09					19-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		0-1					0-1					0.2-1.7				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U	0.19	0.19	0.047	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.18	0.18	0.098	U	U	0.16	0.16	0.087	U	U	0.19	0.19	0.1	U	U
Dinitrobenzene, 1,3-	mg/kg	0.18	0.18	0.048	U	U	0.16	0.16	0.042	U	U	0.19	0.19	0.05	U	U
Dinitrotoluene, 2,4-	mg/kg	0.18	0.18	0.054	U	U	0.16	0.16	0.048	U	U	0.19	0.19	0.057	U	U
Dinitrotoluene, 2,6-	mg/kg	0.0563	0.18	0.048	J	J	0.16	0.16	0.042	U	U	0.19	0.19	0.05	U	U
HMX	mg/kg	0.18	0.18	0.077	U	U	0.16	0.16	0.069	U	U	0.19	0.19	0.082	U	U
Nitrobenzene	mg/kg	0.18	0.18	0.059	U	U	0.16	0.16	0.053	U	U	0.19	0.19	0.063	U	U
Nitrotoluene, 2-	mg/kg	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U	0.19	0.19	0.047	U	U
Nitrotoluene, 3-	mg/kg	0.18	0.18	0.075	U	U	0.16	0.16	0.067	U	U	0.19	0.19	0.08	U	U
Nitrotoluene, 4-	mg/kg	0.18	0.18	0.056	U	U	0.16	0.16	0.049	U	U	0.19	0.19	0.059	U	U
RDX	mg/kg	0.18	0.18	0.076	U	U	0.16	0.16	0.068	U	U	0.19	0.19	0.081	U	U
Tetryl	mg/kg	0.18	0.18	0.046	U	U	0.16	0.16	0.041	U	U	0.19	0.19	0.048	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U	0.19	0.19	0.047	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U	0.19	0.19	0.047	U	U
% Solids	Percent	67.3	0				77.2	0				38.9	0			
Aluminum	mg/kg	5060	14	0.79		J	7580	13	0.69		J	8820	25	1.4		J
Antimony	mg/kg	4.3	4.3	0.32	U	UJ	3.8	3.8	0.28	U	UJ	7.6	7.6	0.57	U	UJ
Arsenic	mg/kg	7.7	0.58	0.26			4.9	0.5	0.23			12.4	1	0.45		
Barium	mg/kg	59	14	0.36			48.1	13	0.31			90.7	25	0.63		
Beryllium	mg/kg	0.69	0.36	0.072			0.57	0.31	0.063			1.7	0.63	0.13		
Cadmium	mg/kg	0.33	0.29	0.072			0.25	0.25	0.063	U	U	0.5	0.5	0.13	U	U
Calcium	mg/kg	8460	360	7.2		J	11700	310	6.3		J	11200	630	13		J
Chromium	mg/kg	8.8	1.4	0.24		J	11	1.3	0.2		J	14.3	2.6	0.4		J
Cobalt	mg/kg	4.5	3.6	0.06		J	5.7	3.1	0.052		J	6.7	6.3	0.1		J
Copper	mg/kg	124	1.8	0.15			11.6	1.6	0.13			14.2	3.2	0.26		
Iron	mg/kg	12400	7.2	1.7		J	13300	6.3	1.4		J	20100	13	2.9		J
Lead	mg/kg	16.5	7.2	0.14			9.7	6.3	0.13			3.9	13	0.25	B	J
Magnesium	mg/kg	2640	360	7.2		J	5000	310	6.3		J	1210	630	13		J
Manganese	mg/kg	99.2	1.1	0.036		J	353	1.9	0.063		J	148	1.9	0.063		J
Mercury	mg/kg	0.15	0.12	0.017			0.047	0.11	0.016	B	J	0.036	0.21	0.031	B	J
Nickel	mg/kg	13	2.9	0.17			13.6	2.5	0.14			15.1	5	0.29		
Potassium	mg/kg	524	720	7.2	B	J	818	630	6.3		J	1290	1300	13	B	J
Selenium	mg/kg	1.1	7.2	0.22	B	J	0.59	6.3	0.19	B	J	1.9	13	0.39	B	J
Silver	mg/kg	0.72	0.72	0.087	U	UJ	0.63	0.63	0.075	U	J	1.3	1.3	0.15	U	UJ
Sodium	mg/kg	238	720	36	B	J	196	630	31	B	J	570	1300	63	B	J
Thallium	mg/kg	2.9	2.9	1	U	U	0.63	0.63	0.21	U	U	6.5	6.5	4.3	U	U
Vanadium	mg/kg	14.1	3.6	0.048			19.3	3.1	0.042			23.2	6.3	0.083		
Zinc	mg/kg	70.5	1.4	0.27		J	40.4	1.3	0.24		J	15.9	2.5	0.48		J
Aroclor 1016	mg/kg	0.025	0.025	0.012	U	U	0.022	0.022	0.011	U	U	0.043	0.043	0.022	U	U
Aroclor 1221	mg/kg	0.025	0.025	0.02	U	U	0.022	0.022	0.017	U	U	0.043	0.043	0.035	U	U
Aroclor 1232	mg/kg	0.025	0.025	0.02	U	U	0.022	0.022	0.017	U	U	0.043	0.043	0.035	U	U
Aroclor 1242	mg/kg	0.025	0.025	0.012	U	U	0.022	0.022	0.011	U	U	0.043	0.043	0.022	U	U
Aroclor 1248	mg/kg	0.025	0.025	0.012	U	U	0.022	0.022	0.011	U	U	0.043	0.043	0.022	U	U
Aroclor 1254	mg/kg	0.025	0.025	0.012	U	U	0.022	0.022	0.011	U	U	0.043	0.043	0.022	U	U
Aroclor 1260	mg/kg	0.015	0.025	0.012	J	J	0.022	0.022	0.011	U	U	0.043	0.043	0.022	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Acenaphthene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Acenaphthylene	mg/kg	0.0516	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Anthracene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzo(a)anthracene	mg/kg	0.156	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzo(a)pyrene	mg/kg	0.168	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzo(b)fluoranthene	mg/kg	0.268	0.25	0.049			0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzo(ghi)perylene	mg/kg	0.0882	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzo(k)fluoranthene	mg/kg	0.0972	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Benzoic acid	mg/kg	1.2	1.2	0.49	U	U	1.1	1.1	0.43	U	U	2.1	2.1	0.85	U	U
Benzyl alcohol	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Bis(2-chloroethyl)ether	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.49	0.49	0.25	U	U	0.43	0.43	0.21	U	U	0.85	0.85	0.43	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Butyl benzyl phthalate	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Carbazole	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB01					ASH PIT 3-SB02					ASH PIT 3-SB03				
SAMPLE_NO		AP0032					AP0036					AP0039				
SAMPLE_DATE		19-Aug-09					19-Aug-09					19-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		0-1					0-1					0.2-1.7				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Chloroaniline, 4-	mg/kg	0.25	0.25	0.098	U	U	0.21	0.21	0.086	U	U	0.43	0.43	0.17	U	U
Chloronaphthalene, 2-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Chlorophenol, 2-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Chrysene	mg/kg	0.19	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Dibenz(a,h)anthracene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Dibenzofuran	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Dichlorobenzene, 1,2-	mg/kg	0.25	0.25	0.064	U	U	0.21	0.21	0.056	U	U	0.43	0.43	0.11	U	U
Dichlorobenzene, 1,3-	mg/kg	0.25	0.25	0.064	U	U	0.21	0.21	0.056	U	U	0.43	0.43	0.11	U	U
Dichlorobenzene, 1,4-	mg/kg	0.25	0.25	0.059	U	U	0.21	0.21	0.051	U	U	0.43	0.43	0.1	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Dichlorophenol, 2,4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Diethyl phthalate	mg/kg	0.49	0.49	0.25	U	U	0.43	0.43	0.21	U	U	0.85	0.85	0.43	U	U
Dimethyl phthalate	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Dimethylphenol, 2,4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Di-n-butyl phthalate	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.49	0.49	0.16	U	U	0.43	0.43	0.14	U	U	0.85	0.85	0.27	U	U
Dinitrophenol, 2,4-	mg/kg	1.2	1.2	0.49	U	U	1.1	1.1	0.43	U	U	2.1	2.1	0.85	U	U
Dinitrotoluene, 2,4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Dinitrotoluene, 2,6-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Di-n-octyl phthalate	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Fluoranthene	mg/kg	0.401	0.25	0.049			0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Fluorene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Hexachlorobenzene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Hexachlorobutadiene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Hexachlorocyclopentadiene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Hexachloroethane	mg/kg	0.25	0.25	0.059	U	U	0.21	0.21	0.051	U	U	0.43	0.43	0.1	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.0914	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Isophorone	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Methylnaphthalene, 2-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Methylphenol, 2-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Naphthalene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Nitroaniline, 2-	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Nitroaniline, 3-	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Nitroaniline, 4-	mg/kg	0.49	0.49	0.098	U	U	0.43	0.43	0.086	U	U	0.85	0.85	0.17	U	U
Nitrobenzene	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Nitrophenol, 2-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Nitrophenol, 4-	mg/kg	1.2	1.2	0.49	U	U	1.1	1.1	0.43	U	U	2.1	2.1	0.85	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
n-Nitrosodiphenylamine	mg/kg	0.25	0.25	0.098	U	U	0.21	0.21	0.086	U	U	0.43	0.43	0.17	U	U
Pentachlorophenol	mg/kg	1.2	1.2	0.49	U	U	1.1	1.1	0.43	U	U	2.1	2.1	0.85	U	U
Phenanthrene	mg/kg	0.107	0.25	0.049	J	J	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Phenol	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Pyrene	mg/kg	0.273	0.25	0.049			0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.25	0.25	0.049	U	U	0.21	0.21	0.043	U	U	0.43	0.43	0.085	U	U

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB04					ASH PIT 3-SB05					ASH PIT 3-SB06				
SAMPLE_NO		AP0042					AP0045					AP0048				
SAMPLE_DATE		21-Aug-09					21-Aug-09					20-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		0.3-0.8					0.3-1					0.2-1				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.17	0.17	0.044	U	U	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.17	0.17	0.095	U	U	0.18	0.18	0.098	U	U	0.16	0.16	0.087	U	U
Dinitrobenzene, 1,3-	mg/kg	0.17	0.17	0.046	U	U	0.18	0.18	0.048	U	U	0.16	0.16	0.042	U	U
Dinitrotoluene, 2,4-	mg/kg	0.17	0.17	0.052	U	U	0.18	0.18	0.054	U	U	0.16	0.16	0.048	U	U
Dinitrotoluene, 2,6-	mg/kg	0.17	0.17	0.046	U	U	0.0562	0.18	0.048	J	J	0.16	0.16	0.042	U	U
HMX	mg/kg	0.17	0.17	0.075	U	U	0.18	0.18	0.077	U	U	0.16	0.16	0.068	U	U
Nitrobenzene	mg/kg	0.17	0.17	0.058	U	U	0.18	0.18	0.059	U	U	0.16	0.16	0.052	U	U
Nitrotoluene, 2-	mg/kg	0.17	0.17	0.044	U	U	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U
Nitrotoluene, 3-	mg/kg	0.17	0.17	0.073	U	U	0.18	0.18	0.075	U	U	0.16	0.16	0.067	U	U
Nitrotoluene, 4-	mg/kg	0.17	0.17	0.054	U	U	0.18	0.18	0.056	U	U	0.16	0.16	0.049	U	U
RDX	mg/kg	0.17	0.17	0.074	U	U	0.18	0.18	0.076	U	U	0.16	0.16	0.067	U	U
Tetryl	mg/kg	0.17	0.17	0.045	U	U	0.18	0.18	0.046	U	U	0.16	0.16	0.04	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.17	0.17	0.044	U	U	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.17	0.17	0.044	U	U	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U
% Solids	Percent	33.6	0				37.9	0				63.6	0			
Aluminum	mg/kg	8240	29	1.6			9350	26	1.4			8770	16	0.86		
Antimony	mg/kg	8.8	8.8	0.66	U	U	7.8	7.8	0.58	U	U	1.2	9.3	0.7	B	J
Arsenic	mg/kg	29	1.2	0.53			13.7	1	0.47			12.7	1.2	0.56		
Barium	mg/kg	127	29	0.74			82.2	26	0.65			203	16	0.39		
Beryllium	mg/kg	2.1	0.74	0.15			1.5	0.65	0.13			0.74	0.39	0.078		
Cadmium	mg/kg	0.3	0.59	0.15	B	J	0.52	0.52	0.13	U	U	3.1	3.1	1.6	U	U
Calcium	mg/kg	15900	740	15			12800	650	13			2060	390	7.8		
Chromium	mg/kg	15.5	3	0.48			13.6	2.6	0.42			9.6	1.6	0.24		
Cobalt	mg/kg	8.9	7.4	0.12			7.4	6.5	0.11			4.5	3.9	0.065		
Copper	mg/kg	43.6	3.7	0.31			19.3	3.2	0.27			21.6	1.9	0.16		
Iron	mg/kg	24000	15	3.4			22800	13	3			68300	16	3.6		
Lead	mg/kg	20.4	15	0.29			12.5	13	0.26	B	J	4.5	16	0.31	B	J
Magnesium	mg/kg	2300	740	15			1120	650	13			343	390	7.8	B	J
Manganese	mg/kg	322	2.2	0.074			339	1.9	0.065			54.5	2.3	0.078		
Mercury	mg/kg	0.13	0.24	0.035	B	J	0.22	0.22	0.032	U	U	0.13	0.13	0.019	U	U
Nickel	mg/kg	22.9	5.9	0.34			17.2	5.2	0.3			11.5	3.1	0.18		
Potassium	mg/kg	1060	1500	15	B	J	1110	1300	13	B	J	923	780	7.8		
Selenium	mg/kg	2.9	15	0.46	B	J	1.7	13	0.4	B	J	1.4	16	0.48	B	J
Silver	mg/kg	1.5	1.5	0.18	U	U	1.3	1.3	0.16	U	U	0.78	0.78	0.093	U	U
Sodium	mg/kg	510	1500	74	B	J	531	1300	65	B	J	493	780	39	B	J
Thallium	mg/kg	6	6	2	U	U	5.2	5.2	2.2	U	U	3	1.6	0.53		
Vanadium	mg/kg	28.4	7.4	0.097			23.7	6.5	0.085			15.1	7.8	0.1		
Zinc	mg/kg	68.3	2.9	0.56			66.3	2.6	0.49			17.2	1.6	0.3		
Aroclor 1016	mg/kg	0.05	0.05	0.025	U	U	0.044	0.044	0.022	U	U	0.027	0.027	0.013	U	U
Aroclor 1221	mg/kg	0.05	0.05	0.04	U	U	0.044	0.044	0.035	U	U	0.027	0.027	0.021	U	U
Aroclor 1232	mg/kg	0.05	0.05	0.04	U	U	0.044	0.044	0.035	U	U	0.027	0.027	0.021	U	U
Aroclor 1242	mg/kg	0.05	0.05	0.025	U	U	0.044	0.044	0.022	U	U	0.027	0.027	0.013	U	U
Aroclor 1248	mg/kg	0.05	0.05	0.025	U	U	0.044	0.044	0.022	U	U	0.027	0.027	0.013	U	U
Aroclor 1254	mg/kg	0.05	0.05	0.025	U	U	0.044	0.044	0.022	U	U	0.027	0.027	0.013	U	U
Aroclor 1260	mg/kg	0.043	0.05	0.025	J	J	0.044	0.044	0.022	U	U	0.027	0.027	0.013	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Acenaphthene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Acenaphthylene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Anthracene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzo(a)anthracene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzo(a)pyrene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzo(b)fluoranthene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzo(ghi)perylene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzo(k)fluoranthene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Benzoic acid	mg/kg	2.5	2.5	0.99	U	U	2.2	2.2	0.87	U	U	1.3	1.3	0.52	U	U
Benzyl alcohol	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Bis(2-chloroethyl)ether	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.99	0.99	0.49	U	U	0.87	0.87	0.43	U	U	0.52	0.52	0.26	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Butyl benzyl phthalate	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Carbazole	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB04					ASH PIT 3-SB05					ASH PIT 3-SB06				
SAMPLE_NO		AP0042					AP0045					AP0048				
SAMPLE_DATE		21-Aug-09					21-Aug-09					20-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		0.3-0.8					0.3-1					0.2-1				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Chloroaniline, 4-	mg/kg	0.49	0.49	0.2	U	U	0.43	0.43	0.17	U	U	0.26	0.26	0.1	U	U
Chloronaphthalene, 2-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Chlorophenol, 2-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Chrysene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Dibenz(a,h)anthracene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Dibenzofuran	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Dichlorobenzene, 1,2-	mg/kg	0.49	0.49	0.13	U	U	0.43	0.43	0.11	U	U	0.26	0.26	0.068	U	U
Dichlorobenzene, 1,3-	mg/kg	0.49	0.49	0.13	U	U	0.43	0.43	0.11	U	U	0.26	0.26	0.068	U	U
Dichlorobenzene, 1,4-	mg/kg	0.49	0.49	0.12	U	U	0.43	0.43	0.1	U	U	0.26	0.26	0.063	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Dichlorophenol, 2,4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Diethyl phthalate	mg/kg	0.99	0.99	0.49	U	U	0.87	0.87	0.43	U	U	0.52	0.52	0.26	U	U
Dimethyl phthalate	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Dimethylphenol, 2,4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Di-n-butyl phthalate	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.99	0.99	0.32	U	U	0.87	0.87	0.28	U	U	0.52	0.52	0.17	U	U
Dinitrophenol, 2,4-	mg/kg	2.5	2.5	0.99	U	U	2.2	2.2	0.87	U	U	1.3	1.3	0.52	U	U
Dinitrotoluene, 2,4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Dinitrotoluene, 2,6-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Di-n-octyl phthalate	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Fluoranthene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Fluorene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Hexachlorobenzene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Hexachlorobutadiene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Hexachlorocyclopentadiene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Hexachloroethane	mg/kg	0.49	0.49	0.12	U	U	0.43	0.43	0.1	U	U	0.26	0.26	0.063	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Isophorone	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Methylnaphthalene, 2-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Methylphenol, 2-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Naphthalene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Nitroaniline, 2-	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Nitroaniline, 3-	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Nitroaniline, 4-	mg/kg	0.99	0.99	0.2	U	U	0.87	0.87	0.17	U	U	0.52	0.52	0.1	U	U
Nitrobenzene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Nitrophenol, 2-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Nitrophenol, 4-	mg/kg	2.5	2.5	0.99	U	U	2.2	2.2	0.87	U	U	1.3	1.3	0.52	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
n-Nitrosodiphenylamine	mg/kg	0.49	0.49	0.2	U	U	0.43	0.43	0.17	U	U	0.26	0.26	0.1	U	U
Pentachlorophenol	mg/kg	2.5	2.5	0.99	U	U	2.2	2.2	0.87	U	U	1.3	1.3	0.52	U	U
Phenanthrene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Phenol	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Pyrene	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.49	0.49	0.099	U	U	0.43	0.43	0.087	U	U	0.26	0.26	0.052	U	U

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB07					ASH PIT 3-SB08					ASH PIT 3-SB08				
SAMPLE_NO		AP0051					AP0054					AP0056				
SAMPLE_DATE		21-Aug-09					21-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					FD				
DEPTH		0-1					0.3-1					0.3-1				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.19	0.19	0.048	U	U	0.16	0.16	0.039	U	U	0.18	0.18	0.046	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.19	0.19	0.1	U	U	0.16	0.16	0.086	U	U	0.18	0.18	0.1	U	U
Dinitrobenzene, 1,3-	mg/kg	0.19	0.19	0.051	U	U	0.16	0.16	0.042	U	U	0.18	0.18	0.049	U	U
Dinitrotoluene, 2,4-	mg/kg	0.19	0.19	0.058	U	U	0.16	0.16	0.047	U	U	0.18	0.18	0.055	U	U
Dinitrotoluene, 2,6-	mg/kg	0.19	0.19	0.051	U	U	0.0547	0.16	0.042	J	J	0.0776	0.18	0.049	J	J
HMX	mg/kg	0.19	0.19	0.083	U	U	0.16	0.16	0.068	U	U	0.18	0.18	0.079	U	U
Nitrobenzene	mg/kg	0.19	0.19	0.063	U	U	0.16	0.16	0.052	U	U	0.18	0.18	0.061	U	U
Nitrotoluene, 2-	mg/kg	0.19	0.19	0.048	U	U	0.16	0.16	0.039	U	U	0.18	0.18	0.046	U	U
Nitrotoluene, 3-	mg/kg	0.19	0.19	0.081	U	U	0.16	0.16	0.066	U	U	0.18	0.18	0.077	U	U
Nitrotoluene, 4-	mg/kg	0.19	0.19	0.06	U	U	0.16	0.16	0.049	U	U	0.18	0.18	0.057	U	U
RDX	mg/kg	0.19	0.19	0.082	U	U	0.16	0.16	0.067	U	U	0.18	0.18	0.078	U	U
Tetryl	mg/kg	0.19	0.19	0.049	U	U	0.16	0.16	0.04	U	U	0.18	0.18	0.047	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.19	0.19	0.048	U	U	0.16	0.16	0.039	U	U	0.18	0.18	0.046	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.19	0.19	0.048	U	U	0.16	0.16	0.039	U	U	0.18	0.18	0.046	U	U
% Solids	Percent	53.1	0				37.6	0				30.8	0			
Aluminum	mg/kg	4760	18	1			7540	25	1.4			10400	32	1.8		
Antimony	mg/kg	5.5	5.5	0.42	U	U	7.6	7.6	0.57	U	U	0.88	9.7	0.73	B	J
Arsenic	mg/kg	7.7	0.74	0.33			27.3	1	0.46			60.8	1.3	0.58		J
Barium	mg/kg	38.5	18	0.46			83.5	25	0.63			110	32	0.81		
Beryllium	mg/kg	0.41	0.46	0.092	B	J	1.6	0.63	0.13			2	0.81	0.16		J
Cadmium	mg/kg	0.44	0.37	0.092			0.51	0.51	0.13	U	U	3.3	3.3	1.6	U	U
Calcium	mg/kg	14100	460	9.2			17700	630	13			14900	810	16		J
Chromium	mg/kg	6.9	1.8	0.3			14.3	2.6	0.4			18.8	3.2	0.52		
Cobalt	mg/kg	5	4.6	0.077			7.6	6.3	0.11			8.1	8.1	0.13		
Copper	mg/kg	38.9	2.3	0.19			20.5	3.2	0.27			27.6	4.1	0.34		
Iron	mg/kg	15200	9.2	2.1			28400	13	2.9			50200	16	3.7		J
Lead	mg/kg	12.2	9.2	0.18			6.7	13	0.25	B	J	9.8	16	0.32	B	J
Magnesium	mg/kg	3130	460	9.2			1590	630	13			2110	810	16		J
Manganese	mg/kg	217	1.4	0.046			280	1.9	0.063			253	2.4	0.081		J
Mercury	mg/kg	0.066	0.14	0.02	B	J	0.079	0.22	0.032	B	J	0.071	0.24	0.034	B	J
Nickel	mg/kg	13.1	3.7	0.21			17.9	5.1	0.29			20.7	6.5	0.37		
Potassium	mg/kg	634	920	9.2	B	J	948	1300	13	B	J	1280	1600	16	B	J
Selenium	mg/kg	1.6	9.2	0.29	B	J	2.2	13	0.39	B	J	3.3	16	0.5	B	J
Silver	mg/kg	0.92	0.92	0.11	U	U	1.3	1.3	0.15	U	U	1.6	1.6	0.19	U	U
Sodium	mg/kg	168	920	46	B	J	470	1300	63	B	J	658	1600	81	B	J
Thallium	mg/kg	0.92	0.92	0.31	U	U	1.3	1.3	0.43	U	U	1.6	1.6	0.55	U	U
Vanadium	mg/kg	10.7	4.6	0.061			24.3	6.3	0.084			33.5	8.1	0.11		
Zinc	mg/kg	78.7	1.8	0.35			27.2	2.5	0.48			40.8	3.2	0.62		
Aroclor 1016	mg/kg	0.031	0.031	0.016	U	U	0.045	0.045	0.023	U	U	0.054	0.054	0.027	U	U
Aroclor 1221	mg/kg	0.031	0.031	0.025	U	U	0.045	0.045	0.036	U	U	0.054	0.054	0.043	U	U
Aroclor 1232	mg/kg	0.031	0.031	0.025	U	U	0.045	0.045	0.036	U	U	0.054	0.054	0.043	U	U
Aroclor 1242	mg/kg	0.031	0.031	0.016	U	U	0.045	0.045	0.023	U	U	0.054	0.054	0.027	U	U
Aroclor 1248	mg/kg	0.031	0.031	0.016	U	U	0.045	0.045	0.023	U	U	0.054	0.054	0.027	U	U
Aroclor 1254	mg/kg	0.031	0.031	0.016	U	U	0.045	0.045	0.023	U	U	0.054	0.054	0.027	U	U
Aroclor 1260	mg/kg	0.031	0.031	0.016	U	U	0.045	0.045	0.023	U	U	0.054	0.054	0.027	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Acenaphthene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Acenaphthylene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Anthracene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzo(a)anthracene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzo(a)pyrene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzo(b)fluoranthene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzo(ghi)perylene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzo(k)fluoranthene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Benzoic acid	mg/kg	1.6	1.6	0.63	U	U	2.2	2.2	0.88	U	U	2.8	2.8	1.1	U	U
Benzyl alcohol	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Bis(2-chloroethyl)ether	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.63	0.63	0.31	U	U	0.88	0.88	0.44	U	U	1.1	1.1	0.55	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Butyl benzyl phthalate	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Carbazole	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB07					ASH PIT 3-SB08					ASH PIT 3-SB08				
SAMPLE_NO		AP0051					AP0054					AP0056				
SAMPLE_DATE		21-Aug-09					21-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					FD				
DEPTH		0-1					0.3-1					0.3-1				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Chloroaniline, 4-	mg/kg	0.31	0.31	0.13	U	U	0.44	0.44	0.18	U	U	0.55	0.55	0.22	U	U
Chloronaphthalene, 2-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Chlorophenol, 2-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Chrysene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Dibenz(a,h)anthracene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Dibenzofuran	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Dichlorobenzene, 1,2-	mg/kg	0.31	0.31	0.081	U	U	0.44	0.44	0.11	U	U	0.55	0.55	0.14	U	U
Dichlorobenzene, 1,3-	mg/kg	0.31	0.31	0.081	U	U	0.44	0.44	0.11	U	U	0.55	0.55	0.14	U	U
Dichlorobenzene, 1,4-	mg/kg	0.31	0.31	0.075	U	U	0.44	0.44	0.11	U	U	0.55	0.55	0.13	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Dichlorophenol, 2,4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Diethyl phthalate	mg/kg	0.63	0.63	0.31	U	U	0.88	0.88	0.44	U	U	1.1	1.1	0.55	U	U
Dimethyl phthalate	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Dimethylphenol, 2,4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Di-n-butyl phthalate	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.63	0.63	0.2	U	U	0.88	0.88	0.28	U	U	1.1	1.1	0.35	U	U
Dinitrophenol, 2,4-	mg/kg	1.6	1.6	0.63	U	U	2.2	2.2	0.88	U	U	2.8	2.8	1.1	U	U
Dinitrotoluene, 2,4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Dinitrotoluene, 2,6-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Di-n-octyl phthalate	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Fluoranthene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Fluorene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Hexachlorobenzene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Hexachlorobutadiene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Hexachlorocyclopentadiene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Hexachloroethane	mg/kg	0.31	0.31	0.075	U	U	0.44	0.44	0.11	U	U	0.55	0.55	0.13	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Isophorone	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Methylnaphthalene, 2-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Methylphenol, 2-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Naphthalene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Nitroaniline, 2-	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Nitroaniline, 3-	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Nitroaniline, 4-	mg/kg	0.63	0.63	0.13	U	U	0.88	0.88	0.18	U	U	1.1	1.1	0.22	U	U
Nitrobenzene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Nitrophenol, 2-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Nitrophenol, 4-	mg/kg	1.6	1.6	0.63	U	U	2.2	2.2	0.88	U	U	2.8	2.8	1.1	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
n-Nitrosodiphenylamine	mg/kg	0.31	0.31	0.13	U	U	0.44	0.44	0.18	U	U	0.55	0.55	0.22	U	U
Pentachlorophenol	mg/kg	1.6	1.6	0.63	U	U	2.2	2.2	0.88	U	U	2.8	2.8	1.1	U	U
Phenanthrene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Phenol	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Pyrene	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.31	0.31	0.063	U	U	0.44	0.44	0.088	U	U	0.55	0.55	0.11	U	U

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligram(s) per kilogram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB01					ASH PIT 3-SB02					ASH PIT 3-SB04				
SAMPLE_NO		AP0033					AP0037					AP0043				
SAMPLE_DATE		19-Aug-09					19-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		3-5					1.2-2.3					0.8-1.5				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.15	0.15	0.038	U	U	0.18	0.18	0.044	U	U	0.16	0.16	0.039	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.15	0.15	0.083	U	U	0.18	0.18	0.096	U	U	0.16	0.16	0.086	U	U
Dinitrobenzene, 1,3-	mg/kg	0.15	0.15	0.04	U	U	0.18	0.18	0.047	U	U	0.16	0.16	0.042	U	U
Dinitrotoluene, 2,4-	mg/kg	0.15	0.15	0.046	U	U	0.18	0.18	0.053	U	U	0.16	0.16	0.047	U	U
Dinitrotoluene, 2,6-	mg/kg	0.15	0.15	0.04	U	U	0.0512	0.18	0.047	J	J	0.16	0.16	0.042	U	U
HMX	mg/kg	0.15	0.15	0.066	U	U	0.18	0.18	0.076	U	U	0.16	0.16	0.068	U	U
Nitrobenzene	mg/kg	0.15	0.15	0.05	U	U	0.18	0.18	0.058	U	U	0.16	0.16	0.052	U	U
Nitrotoluene, 2-	mg/kg	0.15	0.15	0.038	U	U	0.18	0.18	0.044	U	U	0.16	0.16	0.039	U	U
Nitrotoluene, 3-	mg/kg	0.15	0.15	0.064	U	U	0.18	0.18	0.074	U	U	0.16	0.16	0.066	U	U
Nitrotoluene, 4-	mg/kg	0.15	0.15	0.047	U	U	0.18	0.18	0.055	U	U	0.16	0.16	0.049	U	U
RDX	mg/kg	0.15	0.15	0.065	U	U	0.18	0.18	0.075	U	U	0.16	0.16	0.067	U	U
Tetryl	mg/kg	0.15	0.15	0.039	U	U	0.18	0.18	0.045	U	U	0.16	0.16	0.04	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.15	0.15	0.038	U	U	0.18	0.18	0.044	U	U	0.16	0.16	0.039	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.15	0.15	0.038	U	U	0.18	0.18	0.044	U	U	0.16	0.16	0.039	U	U
% Solids	Percent	80.6	0				36.4	0				81.5	0			
Aluminum	mg/kg	7010	12	0.68		J	10400	27	1.5		J	4870	12	0.64		
Antimony	mg/kg	7.4	7.4	0.56	U	UJ	8.1	8.1	0.61	U	UJ	7	7	0.53	U	U
Arsenic	mg/kg	5	0.99	0.45			12.9	1.1	0.48			8.5	0.93	0.42		
Barium	mg/kg	41.2	12	0.31			85.7	27	0.67			41.5	12	0.29		
Beryllium	mg/kg	0.5	0.31	0.062			1.5	0.67	0.13			0.4	0.29	0.058		
Cadmium	mg/kg	0.18	0.25	0.062	B	J	0.54	0.54	0.13	U	U	0.2	0.23	0.058	B	J
Calcium	mg/kg	49300	620	12		J	9690	670	13		J	47500	580	12		
Chromium	mg/kg	10.3	1.2	0.198		J	14.9	2.6	0.44		J	7.7	1.2	0.186		
Cobalt	mg/kg	6.7	3.1	0.051		J	6.3	6.7	0.11	B	J	5.9	2.9	0.048		
Copper	mg/kg	18.4	1.6	0.13			16.2	3.4	0.28			15	1.5	0.12		
Iron	mg/kg	14500	6.2	1.4		J	24700	13	3.1		J	11200	5.8	1.3		
Lead	mg/kg	9.3	12	0.25	B	J	3.4	13	0.27	B	J	8.1	12	0.23	B	J
Magnesium	mg/kg	16600	310	6.2		J	891	670	13		J	14900	290	5.8		
Manganese	mg/kg	410	1.9	0.062		J	120	2	0.067		J	362	1.8	0.058		
Mercury	mg/kg	0.015	0.091	0.013	B	J	0.22	0.22	0.032	U	U	0.014	0.09	0.013	B	J
Nickel	mg/kg	17.1	2.5	0.14			13.4	5.4	0.31			14.3	2.3	0.13		
Potassium	mg/kg	1970	620	6.2		J	1570	1300	13		J	1290	580	5.8		
Selenium	mg/kg	0.84	12	0.38	B	J	2.2	13	0.42	B	J	1.1	12	0.36	B	J
Silver	mg/kg	0.62	0.62	0.074	U	UJ	1.3	1.3	0.16	U	UJ	0.58	0.58	0.07	U	U
Sodium	mg/kg	293	620	31	B	J	640	1300	67	B	J	224	580	29	B	J
Thallium	mg/kg	0.62	0.62	0.21	U	U	6.5	6.5	4.6	U	U	0.58	0.58	0.2	U	U
Vanadium	mg/kg	16.3	3.1	0.041			24.3	6.7	0.089			13.3	2.9	0.039		
Zinc	mg/kg	44.7	1.2	0.24		J	30.5	2.7	0.51		J	37	1.2	0.22		
Aroclor 1016	mg/kg	0.021	0.021	0.01	U	U	0.047	0.047	0.023	U	U	0.021	0.021	0.01	U	U
Aroclor 1221	mg/kg	0.021	0.021	0.017	U	U	0.047	0.047	0.037	U	U	0.021	0.021	0.017	U	U
Aroclor 1232	mg/kg	0.021	0.021	0.017	U	U	0.047	0.047	0.037	U	U	0.021	0.021	0.017	U	U
Aroclor 1242	mg/kg	0.021	0.021	0.01	U	U	0.047	0.047	0.023	U	U	0.021	0.021	0.01	U	U
Aroclor 1248	mg/kg	0.021	0.021	0.01	U	U	0.047	0.047	0.023	U	U	0.021	0.021	0.01	U	U
Aroclor 1254	mg/kg	0.021	0.021	0.01	U	U	0.047	0.047	0.023	U	U	0.021	0.021	0.01	U	U
Aroclor 1260	mg/kg	0.021	0.021	0.01	U	U	0.047	0.047	0.023	U	U	0.021	0.021	0.01	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Acenaphthene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Acenaphthylene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Anthracene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzo(a)anthracene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzo(a)pyrene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzo(b)fluoranthene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzo(ghi)perylene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzo(k)fluoranthene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Benzoic acid	mg/kg	1	1	0.41	U	U	2.3	2.3	0.92	U	U	1	1	0.41	U	U
Benzyl alcohol	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.41	0.41	0.2	U	U	0.92	0.92	0.46	U	U	0.41	0.41	0.2	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB01					ASH PIT 3-SB02					ASH PIT 3-SB04				
SAMPLE_NO		AP0033					AP0037					AP0043				
SAMPLE_DATE		19-Aug-09					19-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		3-5					1.2-2.3					0.8-1.5				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Butyl benzyl phthalate	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Carbazole	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Chloroaniline, 4-	mg/kg	0.2	0.2	0.082	U	U	0.46	0.46	0.18	U	U	0.2	0.2	0.081	U	U
Chloronaphthalene, 2-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Chlorophenol, 2-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Chrysene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Dibenz(a,h)anthracene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Dibenzofuran	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	0.2	0.053	U	U	0.46	0.46	0.12	U	U	0.2	0.2	0.053	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	0.2	0.053	U	U	0.46	0.46	0.12	U	U	0.2	0.2	0.053	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	0.2	0.049	U	U	0.46	0.46	0.11	U	U	0.2	0.2	0.049	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Diethyl phthalate	mg/kg	0.41	0.41	0.2	U	U	0.92	0.92	0.46	U	U	0.41	0.41	0.2	U	U
Dimethyl phthalate	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Di-n-butyl phthalate	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.41	0.41	0.13	U	U	0.92	0.92	0.29	U	U	0.41	0.41	0.13	U	U
Dinitrophenol, 2,4-	mg/kg	1	1	0.41	U	U	2.3	2.3	0.92	U	U	1	1	0.41	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Di-n-octyl phthalate	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Fluoranthene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Fluorene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Hexachlorobenzene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Hexachlorobutadiene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Hexachloroethane	mg/kg	0.2	0.2	0.049	U	U	0.46	0.46	0.11	U	U	0.2	0.2	0.049	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Isophorone	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Methylnaphthalene, 2-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Methylphenol, 2-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Naphthalene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Nitroaniline, 2-	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Nitroaniline, 3-	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Nitroaniline, 4-	mg/kg	0.41	0.41	0.082	U	U	0.92	0.92	0.18	U	U	0.41	0.41	0.081	U	U
Nitrobenzene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Nitrophenol, 2-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Nitrophenol, 4-	mg/kg	1	1	0.41	U	U	2.3	2.3	0.92	U	U	1	1	0.41	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	0.2	0.082	U	U	0.46	0.46	0.18	U	U	0.2	0.2	0.081	U	U
Pentachlorophenol	mg/kg	1	1	0.41	U	U	2.3	2.3	0.92	U	U	1	1	0.41	U	U
Phenanthrene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Phenol	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Pyrene	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	0.2	0.041	U	U	0.46	0.46	0.092	U	U	0.2	0.2	0.041	U	U

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB05					ASH PIT 3-SB06					ASH PIT 3-SB07				
SAMPLE_NO		AP0046					AP0061A					AP0052				
SAMPLE_DATE		21-Aug-09					20-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		1-2					2-2.7					1-2				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.18	0.18	0.044	U	U	0.16	0.16	0.04	U	U	0.17	0.17	0.043	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.18	0.18	0.096	U	U	0.16	0.16	0.088	U	U	0.17	0.17	0.094	U	U
Dinitrobenzene, 1,3-	mg/kg	0.18	0.18	0.046	U	U	0.16	0.16	0.043	U	U	0.17	0.17	0.046	U	U
Dinitrotoluene, 2,4-	mg/kg	0.18	0.18	0.053	U	U	0.16	0.16	0.048	U	U	0.17	0.17	0.052	U	U
Dinitrotoluene, 2,6-	mg/kg	0.18	0.18	0.046	U	U	0.16	0.16	0.043	U	U	0.17	0.17	0.046	U	U
HMX	mg/kg	0.18	0.18	0.075	U	U	0.16	0.16	0.069	U	U	0.17	0.17	0.074	U	U
Nitrobenzene	mg/kg	0.18	0.18	0.058	U	U	0.16	0.16	0.053	U	U	0.17	0.17	0.057	U	U
Nitrotoluene, 2-	mg/kg	0.18	0.18	0.044	U	U	0.16	0.16	0.04	U	U	0.17	0.17	0.043	U	U
Nitrotoluene, 3-	mg/kg	0.18	0.18	0.074	U	U	0.16	0.16	0.067	U	U	0.17	0.17	0.073	U	U
Nitrotoluene, 4-	mg/kg	0.18	0.18	0.054	U	U	0.16	0.16	0.05	U	U	0.17	0.17	0.054	U	U
RDX	mg/kg	0.18	0.18	0.075	U	U	0.16	0.16	0.068	U	U	0.17	0.17	0.074	U	U
Tetryl	mg/kg	0.18	0.18	0.045	U	U	0.16	0.16	0.041	U	U	0.17	0.17	0.044	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.18	0.18	0.044	U	U	0.16	0.16	0.04	U	U	0.17	0.17	0.043	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.18	0.18	0.044	U	U	0.16	0.16	0.04	U	U	0.17	0.17	0.043	U	U
% Solids	Percent	78.3	0				79.2	0				78.2	0			
Aluminum	mg/kg	6010	12	0.68			7840	12	0.67			9910	13	0.7		
Antimony	mg/kg	0.67	7.4	0.56	B	J	0.93	7.3	0.55	B	J	0.72	7.6	0.57	B	J
Arsenic	mg/kg	20.3	0.99	0.45			30.6	0.97	0.44			9.3	1	0.46		
Barium	mg/kg	63.7	12	0.31			65.1	12	0.3			70.5	13	0.32		
Beryllium	mg/kg	0.47	0.31	0.062			0.56	0.3	0.061			0.67	0.32	0.063		
Cadmium	mg/kg	0.21	0.25	0.062	B	J	0.17	0.24	0.061	B	J	0.21	0.25	0.063	B	J
Calcium	mg/kg	52800	620	12			46100	610	12			42400	630	13		
Chromium	mg/kg	9.6	1.2	0.198			11.8	1.2	0.194			15	1.3	0.2		
Cobalt	mg/kg	5.8	3.1	0.051			8.5	3	0.05			8.1	3.2	0.053		
Copper	mg/kg	17.5	1.5	0.13			17.6	1.5	0.13			21.7	1.6	0.13		
Iron	mg/kg	16700	6.2	1.4			20500	6.1	1.4			17700	6.3	1.5		
Lead	mg/kg	9.6	12	0.25	B	J	10	12	0.24	B	J	11.9	13	0.25	B	J
Magnesium	mg/kg	17500	310	6.2			15700	300	6.1			15800	320	6.3		
Manganese	mg/kg	432	1.9	0.062			402	1.8	0.061			477	1.9	0.063		
Mercury	mg/kg	0.03	0.1	0.015	B	J	0.016	0.11	0.015	B	J	0.026	0.11	0.015	B	J
Nickel	mg/kg	16.4	2.5	0.14			18.8	2.4	0.14			22.7	2.5	0.15		
Potassium	mg/kg	1490	620	6.2			1900	610	6.1			2110	630	6.3		
Selenium	mg/kg	1.1	12	0.38	B	J	2.1	12	0.38	B	J	0.9	13	0.39	B	J
Silver	mg/kg	0.62	0.62	0.074	U	U	0.61	0.61	0.073	U	U	0.63	0.63	0.076	U	U
Sodium	mg/kg	261	620	31	B	J	300	610	30	B	J	269	630	32	B	J
Thallium	mg/kg	2.5	2.5	1.05	U	U	0.61	0.61	0.21	U	U	0.63	0.63	0.22	U	U
Vanadium	mg/kg	15.5	3.1	0.041			17.7	3	0.04			21.9	3.2	0.042		
Zinc	mg/kg	41.6	1.2	0.24			49.3	1.2	0.23			53.2	1.3	0.24		
Aroclor 1016	mg/kg	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1221	mg/kg	0.022	0.022	0.017	U	U	0.021	0.021	0.017	U	U	0.021	0.021	0.017	U	U
Aroclor 1232	mg/kg	0.022	0.022	0.017	U	U	0.021	0.021	0.017	U	U	0.021	0.021	0.017	U	U
Aroclor 1242	mg/kg	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1248	mg/kg	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1254	mg/kg	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U	0.021	0.021	0.011	U	U
Aroclor 1260	mg/kg	0.022	0.022	0.011	U	U	0.021	0.021	0.011	U	U	0.021	0.021	0.011	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Acenaphthene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Acenaphthylene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Anthracene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzo(a)anthracene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzo(a)pyrene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzo(b)fluoranthene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzo(ghi)perylene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzo(k)fluoranthene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Benzoic acid	mg/kg	1	1	0.42	U	U	1	1	0.42	U	U	1.1	1.1	0.42	U	U
Benzyl alcohol	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroethyl)ether	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.42	0.42	0.21	U	U	0.42	0.42	0.21	U	U	0.42	0.42	0.21	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB05					ASH PIT 3-SB06					ASH PIT 3-SB07				
SAMPLE_NO		AP0046					AP0061A					AP0052				
SAMPLE_DATE		21-Aug-09					20-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		REG					REG					REG				
DEPTH		1-2					2-2.7					1-2				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Butyl benzyl phthalate	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Carbazole	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Chloroaniline, 4-	mg/kg	0.21	0.21	0.084	U	U	0.21	0.21	0.084	U	U	0.21	0.21	0.084	U	U
Chloronaphthalene, 2-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Chlorophenol, 2-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Chrysene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Dibenz(a,h)anthracene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Dibenzofuran	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Dichlorobenzene, 1,2-	mg/kg	0.21	0.21	0.054	U	U	0.21	0.21	0.054	U	U	0.21	0.21	0.055	U	U
Dichlorobenzene, 1,3-	mg/kg	0.21	0.21	0.054	U	U	0.21	0.21	0.054	U	U	0.21	0.21	0.055	U	U
Dichlorobenzene, 1,4-	mg/kg	0.21	0.21	0.05	U	U	0.21	0.21	0.05	U	U	0.21	0.21	0.05	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Dichlorophenol, 2,4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Diethyl phthalate	mg/kg	0.42	0.42	0.21	U	U	0.42	0.42	0.21	U	U	0.42	0.42	0.21	U	U
Dimethyl phthalate	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Dimethylphenol, 2,4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Di-n-butyl phthalate	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.42	0.42	0.13	U	U	0.42	0.42	0.13	U	U	0.42	0.42	0.13	U	U
Dinitrophenol, 2,4-	mg/kg	1	1	0.42	U	U	1	1	0.42	U	U	1.1	1.1	0.42	U	U
Dinitrotoluene, 2,4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Dinitrotoluene, 2,6-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Di-n-octyl phthalate	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Fluoranthene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Fluorene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Hexachlorobenzene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Hexachlorobutadiene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Hexachlorocyclopentadiene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Hexachloroethane	mg/kg	0.21	0.21	0.05	U	U	0.21	0.21	0.05	U	U	0.21	0.21	0.05	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Isophorone	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Methylnaphthalene, 2-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Methylphenol, 2-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Naphthalene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Nitroaniline, 2-	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Nitroaniline, 3-	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Nitroaniline, 4-	mg/kg	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U	0.42	0.42	0.084	U	U
Nitrobenzene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Nitrophenol, 2-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Nitrophenol, 4-	mg/kg	1	1	0.42	U	U	1	1	0.42	U	U	1.1	1.1	0.42	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
n-Nitrosodiphenylamine	mg/kg	0.21	0.21	0.084	U	U	0.21	0.21	0.084	U	U	0.21	0.21	0.084	U	U
Pentachlorophenol	mg/kg	1	1	0.42	U	U	1	1	0.42	U	U	1.1	1.1	0.42	U	U
Phenanthrene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Phenol	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Pyrene	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U	0.21	0.21	0.042	U	U

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB07					ASH PIT 3-SB08				
SAMPLE_NO		AP0059					AP0055				
SAMPLE_DATE		21-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		FD					REG				
DEPTH		1-2					1-2				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.15	0.15	0.038	U	U	0.14	0.14	0.036	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.15	0.15	0.083	U	U	0.14	0.14	0.079	U	U
Dinitrobenzene, 1,3-	mg/kg	0.15	0.15	0.04	U	U	0.14	0.14	0.038	U	U
Dinitrotoluene, 2,4-	mg/kg	0.15	0.15	0.045	U	U	0.14	0.14	0.043	U	U
Dinitrotoluene, 2,6-	mg/kg	0.15	0.15	0.04	U	U	0.14	0.14	0.038	U	U
HMX	mg/kg	0.15	0.15	0.065	U	U	0.14	0.14	0.062	U	U
Nitrobenzene	mg/kg	0.15	0.15	0.05	U	U	0.14	0.14	0.048	U	U
Nitrotoluene, 2-	mg/kg	0.15	0.15	0.038	U	U	0.14	0.14	0.036	U	U
Nitrotoluene, 3-	mg/kg	0.15	0.15	0.064	U	U	0.14	0.14	0.061	U	U
Nitrotoluene, 4-	mg/kg	0.15	0.15	0.047	U	U	0.14	0.14	0.045	U	U
RDX	mg/kg	0.15	0.15	0.064	U	U	0.14	0.14	0.061	U	U
Tetryl	mg/kg	0.15	0.15	0.039	U	U	0.14	0.14	0.037	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.15	0.15	0.038	U	U	0.14	0.14	0.036	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.15	0.15	0.038	U	U	0.14	0.14	0.036	U	U
% Solids	Percent	76.5	0				80.6	0			
Aluminum	mg/kg	9620	13	0.7			8970	12	0.65		
Antimony	mg/kg	7.6	7.6	0.57	U	U	0.5	3.5	0.27	B	J
Arsenic	mg/kg	6.9	1	0.46			32.7	0.47	0.21		J
Barium	mg/kg	70.1	13	0.32			98.4	12	0.3		
Beryllium	mg/kg	0.63	0.32	0.063			0.64	0.3	0.059		J
Cadmium	mg/kg	0.19	0.25	0.063	B	J	0.14	0.24	0.059	B	J
Calcium	mg/kg	47800	630	13			28000	300	5.9		J
Chromium	mg/kg	14.5	1.3	0.2			12.6	1.2	0.19		
Cobalt	mg/kg	7.3	3.2	0.053			12.2	3	0.049		
Copper	mg/kg	19.4	1.6	0.13			20.9	1.5	0.12		
Iron	mg/kg	14900	6.3	1.5			28300	5.9	1.4		J
Lead	mg/kg	11.2	13	0.25	B	J	8.6	5.9	0.12		
Magnesium	mg/kg	17500	320	6.3			12400	300	5.9		J
Manganese	mg/kg	460	1.9	0.063			1270	8.9	0.3		J
Mercury	mg/kg	0.022	0.1	0.015	B	J	0.029	0.1	0.014	B	J
Nickel	mg/kg	21.4	2.5	0.15			31.9	2.4	0.14		
Potassium	mg/kg	2110	630	6.3			1400	590	5.9		
Selenium	mg/kg	0.98	13	0.39	B	J	0.66	5.9	0.18	B	J
Silver	mg/kg	0.63	0.63	0.076	U	U	0.59	0.59	0.071	U	U
Sodium	mg/kg	280	630	32	B	J	324	590	30	B	J
Thallium	mg/kg	0.63	0.63	0.22	U	U	0.5	0.59	0.2	B	J
Vanadium	mg/kg	21.1	3.2	0.042			20.3	3	0.039		
Zinc	mg/kg	49.5	1.3	0.24			50.6	1.2	0.22		
Aroclor 1016	mg/kg	0.021	0.021	0.011	U	U	0.021	0.021	0.01	U	U
Aroclor 1221	mg/kg	0.021	0.021	0.017	U	U	0.021	0.021	0.017	U	U
Aroclor 1232	mg/kg	0.021	0.021	0.017	U	U	0.021	0.021	0.017	U	U
Aroclor 1242	mg/kg	0.021	0.021	0.011	U	U	0.021	0.021	0.01	U	U
Aroclor 1248	mg/kg	0.021	0.021	0.011	U	U	0.021	0.021	0.01	U	U
Aroclor 1254	mg/kg	0.021	0.021	0.011	U	U	0.021	0.021	0.01	U	U
Aroclor 1260	mg/kg	0.021	0.021	0.011	U	U	0.021	0.021	0.01	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Acenaphthene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Acenaphthylene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Anthracene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzo(a)anthracene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzo(a)pyrene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzo(b)fluoranthene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzo(ghi)perylene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzo(k)fluoranthene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Benzoic acid	mg/kg	1.1	1.1	0.43	U	U	1	1	0.42	U	U
Benzyl alcohol	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroethyl)ether	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.43	0.43	0.22	U	U	0.42	0.42	0.21	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assesment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		ASH PIT 3-SB07					ASH PIT 3-SB08				
SAMPLE_NO		AP0059					AP0055				
SAMPLE_DATE		21-Aug-09					21-Aug-09				
SAMPLE_PURPOSE		FD					REG				
DEPTH		1-2					1-2				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Butyl benzyl phthalate	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Carbazole	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Chloroaniline, 4-	mg/kg	0.22	0.22	0.086	U	U	0.21	0.21	0.084	U	U
Chloronaphthalene, 2-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Chlorophenol, 2-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Chrysene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Dibenz(a,h)anthracene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Dibenzofuran	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Dichlorobenzene, 1,2-	mg/kg	0.22	0.22	0.056	U	U	0.21	0.21	0.054	U	U
Dichlorobenzene, 1,3-	mg/kg	0.22	0.22	0.056	U	U	0.21	0.21	0.054	U	U
Dichlorobenzene, 1,4-	mg/kg	0.22	0.22	0.052	U	U	0.21	0.21	0.05	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Dichlorophenol, 2,4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Diethyl phthalate	mg/kg	0.43	0.43	0.22	U	U	0.42	0.42	0.21	U	U
Dimethyl phthalate	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Dimethylphenol, 2,4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Di-n-butyl phthalate	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.43	0.43	0.14	U	U	0.42	0.42	0.13	U	U
Dinitrophenol, 2,4-	mg/kg	1.1	1.1	0.43	U	U	1	1	0.42	U	U
Dinitrotoluene, 2,4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Dinitrotoluene, 2,6-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Di-n-octyl phthalate	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Fluoranthene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Fluorene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Hexachlorobenzene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Hexachlorobutadiene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Hexachlorocyclopentadiene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Hexachloroethane	mg/kg	0.22	0.22	0.052	U	U	0.21	0.21	0.05	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Isophorone	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Methylnaphthalene, 2-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Methylphenol, 2-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Naphthalene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Nitroaniline, 2-	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Nitroaniline, 3-	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Nitroaniline, 4-	mg/kg	0.43	0.43	0.086	U	U	0.42	0.42	0.084	U	U
Nitrobenzene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Nitrophenol, 2-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Nitrophenol, 4-	mg/kg	1.1	1.1	0.43	U	U	1	1	0.42	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
n-Nitrosodiphenylamine	mg/kg	0.22	0.22	0.086	U	U	0.21	0.21	0.084	U	U
Pentachlorophenol	mg/kg	1.1	1.1	0.43	U	U	1	1	0.42	U	U
Phenanthrene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Phenol	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Pyrene	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.22	0.22	0.043	U	U	0.21	0.21	0.042	U	U

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligram(s) per kilogram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW01					AP3-MW01				
SAMPLE_NO			AP3083					AP3084					AP3085				
SAMPLE_DATE			19-Dec-11					19-Dec-11					19-Dec-11				
DEPTH			1_3 - 1_3 Ft					1_3 - 1_3 Ft					1_3 - 1_3 Ft				
SAMPLE_PURPOSE			REG					FD					FS				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.2	0.2	0.082	U	U	0.2	0.2	0.08	U	U	0.05	0.1	0.05	U	U
Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.1	0.2	0.1	U	U
Dinitrobenzene, 1,3-	N	µg/L	0.2	0.2	0.097	U	U	0.2	0.2	0.095	U	U	0.05	0.1	0.05	U	U
Dinitrotoluene, 2,4-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.05	U	U
Dinitrotoluene, 2,6-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.05	U	U
HMX	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.036	U	U
Nitrobenzene	N	µg/L	0.2	0.2	0.084	U	U	0.2	0.2	0.082	U	U	0.05	0.1	0.05	U	U
Nitrotoluene, 2-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.1	0.5	0.088	U	U
Nitrotoluene, 3-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.1	0.5	0.057	U	U
Nitrotoluene, 4-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.1	0.65	0.088	U	U
RDX	N	µg/L	0.2	0.2	0.2	U	U	0.2	0.2	0.2	U	U	0.05	0.1	0.036	U	U
Tetryl	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.05	U	U
Trinitrobenzene, 1,3,5-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.03	U	U
Trinitrotoluene, 2,4,6-	N	µg/L	0.2	0.2	0.08	U	U	0.2	0.2	0.078	U	U	0.05	0.1	0.05	U	U
Ferrous Iron	N	mg/L	0	0.042													
Alkalinity	N	mg/L											300	5	2.7		
Alkalinity, Carbonate	N	mg/L	302	5	2.5		J	305	5	2.5		J					
Chloride	N	mg/L	1.8	2	1	B	J	1.7	2	1	B	J	1.7	1	0.1		
Cyanide, total	N	mg/L	0.01	0.01	0.005	U	U	0.01	0.01	0.005	U	U	0.01	0.01	0.005	U	U
Hardness (as CaCO3)	N	mg/L	399	23	0.66			416	23	0.66			470	25	16		
Nitrate-Nitrite	N	mg/L	0.1	0.1	0.05	U	U	0.052	0.1	0.05	B	J	0.065	0.1	0.014	J B	B
Sulfate	N	mg/L	162	4	2		J	167	4	2		J	180	2	0.24		
Total dissolved solids	N	mg/L	557	100	10		J	398	100	10		J	530	10	7.4		
Total suspended solids	N	mg/L	10	10	4	U	U	10	10	4	U	U	4	4	1.8	U	U
Turbidity	N	NTU	1	1	1	U	U	1	1	1	U	U	1	0.5	0.11	H	
Aluminum	N	µg/L	200	200	24	U	U	200	200	24	U	U	300	300	75	U	U
Aluminum	Y	µg/L	200	200	20	U	U	200	200	20	U	U	300	300	75	U	U
Antimony	N	µg/L	6	6	1	U	U	6	6	1	U	U	25	25	7.4	U	U
Antimony	Y	µg/L	6	6	1	U	U	6	6	1	U	U	25	25	7.4	U	U
Arsenic	N	µg/L	10	10	1	U	U	10	10	1	U	U	10	10	3.3	U	U
Arsenic	Y	µg/L	10	10	1	U	U	10	10	1	U	U	4.1	10	3.3	J	J
Barium	N	µg/L	40.6	200	4	B	J	39.5	200	4	B	J	45	200	2.8	J	J
Barium	Y	µg/L	40.5	200	1	B	J	43.5	200	1	B	J	46	200	2.8	J	J
Beryllium	N	µg/L	4	4	0.1	U	U	4	4	0.1	U	U	5	5	0.56	U	U
Beryllium	Y	µg/L	4	4	0.1	U	U	4	4	0.1	U	U	5	5	0.56	U	U
Cadmium	N	µg/L	5	5	0.1	U	U	5	5	0.1	U	U	5	5	0.39	U	U
Cadmium	Y	µg/L	5	5	0.1	U	U	5	5	0.1	U	U	5	5	0.39	U	U
Calcium	N	µg/L	117000	1000	50		J	121000	1000	50		J	130000	5000	630		
Calcium	Y	µg/L	119000	1000	50			125000	1000	50			130000	5000	630		
Chromium	N	µg/L	10	10	1	U	U	10	10	1	U	U	7	7	1.4	U	U
Chromium	Y	µg/L	10	10	1	U	U	10	10	1	U	U	7	7	1.4	U	U
Cobalt	N	µg/L	1.2	50	1	B	J	1.1	50	1	B	J	1.7	7	1.5	J	J
Cobalt	Y	µg/L	1.4	50	1	B	J	1.3	50	1	B	J	7	7	1.5	U	U
Copper	N	µg/L	25	25	1	U	U	25	25	1	U	U	25	25	4.4	U	U
Copper	Y	µg/L	7.3	25	1	B	J	25	25	1	U	U	25	25	4.4	U	U
Iron	N	µg/L	57.5	300	23	B	J	70.6	300	23	B	J	130	250	64	J	J
Iron	Y	µg/L	74.1	300	34	B	J	67.4	300	34	B	J	81	250	64	J	J
Lead	N	µg/L	5	5	1	U	U	5	5	1	U	U	10	10	1.7	U	U
Lead	Y	µg/L	5	5	1	U	U	5	5	1	U	U	10	10	1.7	U	U
Magnesium	N	µg/L	25900	5000	50		J	27700	5000	50		J	29000	5000	120	B	
Magnesium	Y	µg/L	27400	5000	50			29000	5000	50			29000	5000	120	B	
Manganese	N	µg/L	1760	15	1			1780	15	1			1900	15	1.8		
Manganese	Y	µg/L	1720	15	1			1800	15	1			1900	15	1.8		
Mercury	N	µg/L	1	1	0.071	U	U	1	1	0.071	U	U	0.2	0.2	0.12	U	U
Mercury	Y	µg/L	1	1	0.071	U	U	1	1	0.071	U	U	0.2	0.2	0.12	U	U
Nickel	N	µg/L	40	40	1	U	U	40	40	1	U	U	40	40	2.2	U	U
Nickel	Y	µg/L	40	40	1	U	U	40	40	1	U	U	40	40	2.2	U	U
Potassium	N	µg/L	805	10000	50	B	J	716	10000	50	B	J	900	5000	300	J	J
Potassium	Y	µg/L	744	10000	50	B	J	766	10000	50	B	J	860	5000	300	J	J
Selenium	N	µg/L	10	10	2	U	U	10	10	2	U	U	15	15	4	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW01					AP3-MW01				
SAMPLE_NO			AP3083					AP3084					AP3085				
SAMPLE_DATE			19-Dec-11					19-Dec-11					19-Dec-11				
DEPTH			1_3 - 1_3 Ft					1_3 - 1_3 Ft					1_3 - 1_3 Ft				
SAMPLE_PURPOSE			REG					FD					FS				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Selenium	Y	µg/L	10	10	2	U	U	10	10	2	U	U	15	15	4	U	U
Silver	N	µg/L	10	10	1	U	U	10	10	1	U	U	7	7	1.7	U	U
Silver	Y	µg/L	10	10	1	U	U	10	10	1	U	U	7	7	1.7	U	U
Sodium	N	µg/L	20100	10000	850			19500	10000	850			20000	5000	970		
Sodium	Y	µg/L	19800	10000	750			21300	10000	750			19000	5000	970		
Thallium	N	µg/L	10	10	1.5	U	U	10	10	1.5	U	U	30	30	9.1	U	U
Thallium	Y	µg/L	10	10	1	U	U	10	10	1	U	U	30	30	9.1	U	U
Vanadium	N	µg/L	50	50	1	U	U	50	50	1	U	U	7	7	1.3	U	U
Vanadium	Y	µg/L	50	50	1	U	U	50	50	1	U	U	7	7	1.3	U	U
Zinc	N	µg/L	20	20	1	U	U	20	20	1	U	U	50	50	15	U	U
Zinc	Y	µg/L	20	20	1	U	U	20	20	1	U	U	50	50	15	U	U
3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	2	2	0.78	U	UJ
Acenaphthene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Acenaphthylene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Acetophenone	N	µg/L											0.98	0.98	0.33	U	U
Anthracene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Atrazine	N	µg/L											0.98	0.98	0.33	U	U
Benzaldehyde	N	µg/L											0.98	0.98	0.38	U	U
Benzo(a)anthracene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Benzo(a)pyrene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Benzo(b)fluoranthene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Benzo(ghi)perylene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Benzo(k)fluoranthene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Benzoic acid	N	µg/L	48	48	9.5	U	U	48	48	9.5	U	U					
Benzyl alcohol	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U					
Bibenzene	N	µg/L											0.98	0.98	0.78	U	U
Bis(2-chloroethoxy)methane	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.31	U	U
Bis(2-chloroethyl)ether	N	µg/L	4.8	4.8	0.51	U	U	4.8	4.8	0.51	U	U	0.98	0.98	0.098	U	U
Bis(2-chloroisopropyl)ether	N	µg/L	4.8	4.8	0.51	U	U	4.8	4.8	0.51	U	U	0.98	0.98	0.39	U	U
Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	0.8	2	0.78	J B	B
Bromophenyl phenyl ether, 4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	U
Butyl benzyl phthalate	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	0.98	0.98	0.78	U	U
Caprolactam	N	µg/L											4.9	4.9	0.78	U	U
Carbazole	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.27	U	U
Chloro-3-methylphenol, 4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	UJ
Chloroaniline, 4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	U
Chloronaphthalene, 2-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.098	U	U
Chlorophenol, 2-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.28	U	UJ
Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.29	U	U
Chrysene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Dibenz(a,h)anthracene	N	µg/L	4.8	4.8	0.5	U	U	4.8	4.8	0.5	U	U	0.2	0.2	0.098	U	U
Dibenzofuran	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.098	U	U
Dichlorobenzene, 1,2-	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U					
Dichlorobenzene, 1,3-	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U					
Dichlorobenzene, 1,4-	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U					
Dichlorobenzidine, 3,3'-	N	µg/L	9.5	9.5	0.95	U	U	9.5	9.5	0.95	U	U	4.9	4.9	0.36	U	U
Dichlorophenol, 2,4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	UJ
Diethyl phthalate	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	0.98	0.98	0.59	U	U
Dimethyl phthalate	N	µg/L	4.8	4.8	0.94	U	U	4.8	4.8	0.94	U	U	0.98	0.98	0.28	U	U
Dimethylphenol, 2,4-	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	2	2	0.78	U	UJ
Di-n-butyl phthalate	N	µg/L	4.8	4.8	0.83	U	U	4.8	4.8	0.83	U	U	0.98	0.98	0.66	U	U
Dinitro-2-methylphenol, 4,6-	N	µg/L	9.5	9.5	1.9	U	U	9.5	9.5	1.9	U	U	4.9	4.9	2.4	U	UJ
Dinitrophenol, 2,4-	N	µg/L	24	24	9.5	U	U	24	24	9.5	U	U	4.9	4.9	2.4	U	UJ
Dinitrotoluene, 2,4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	4.9	4.9	0.26	U	U
Dinitrotoluene, 2,6-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	4.9	4.9	0.78	U	U
Di-n-octyl phthalate	N	µg/L	4.8	4.8	1	U	U	4.8	4.8	1	U	U	0.98	0.98	0.78	U	U
Fluoranthene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Fluorene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Hexachlorobenzene	N	µg/L	4.8	4.8	0.53	U	U	4.8	4.8	0.53	U	U	0.2	0.2	0.098	U	U
Hexachlorobutadiene	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U	0.98	0.98	0.26	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW01					AP3-MW01				
SAMPLE_NO			AP3083					AP3084					AP3085				
SAMPLE_DATE			19-Dec-11					19-Dec-11					19-Dec-11				
DEPTH			1_3 - 1_3 Ft					1_3 - 1_3 Ft					1_3 - 1_3 Ft				
SAMPLE_PURPOSE			REG					FD					FS				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Hexachlorocyclopentadiene	N	µg/L	9.5	9.5	1.8	U	U	9.5	9.5	1.8	U	U	9.8	9.8	0.78	U	U
Hexachloroethane	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U	0.98	0.98	0.78	U	U
Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Isophorone	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.26	U	U
Methylnaphthalene, 2-	N	µg/L	4.8	4.8	0.54	U	U	4.8	4.8	0.54	U	U	0.2	0.2	0.098	U	U
Methylphenol, 2-	N	µg/L	4.8	4.8	0.51	U	U	4.8	4.8	0.51	U	U	0.98	0.98	0.78	U	UJ
Naphthalene	N	µg/L	4.8	4.8	0.76	U	U	4.8	4.8	0.76	U	U	0.2	0.2	0.098	U	U
Nitroaniline, 2-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	U
Nitroaniline, 3-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.27	U	U
Nitroaniline, 4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	2	2	0.78	U	U
Nitrobenzene	N	µg/L	4.8	4.8	0.56	U	U	4.8	4.8	0.56	U	U	0.98	0.98	0.039	U	U
Nitrophenol, 2-	N	µg/L	4.8	4.8	0.51	U	U	4.8	4.8	0.51	U	U	2	2	0.27	U	UJ
Nitrophenol, 4-	N	µg/L	24	24	4.8	U	U	24	24	4.8	U	U	4.9	4.9	2.4	U	UJ
n-Nitroso-di-n-propylamine	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.78	U	U
n-Nitrosodiphenylamine	N	µg/L	4.8	4.8	0.95	U	U	4.8	4.8	0.95	U	U	0.98	0.98	0.3	U	U
Pentachlorophenol	N	µg/L	24	24	5.1	U	U	24	24	5.1	U	U	4.9	4.9	2.4	U	UJ
Phenanthrene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Phenol	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.98	0.98	0.59	U	UJ
Pyrene	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	0.2	0.2	0.098	U	U
Trichlorobenzene, 1,2,4-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U					
Trichlorophenol, 2,4,5-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	4.9	4.9	0.29	U	UJ
Trichlorophenol, 2,4,6-	N	µg/L	4.8	4.8	0.48	U	U	4.8	4.8	0.48	U	U	4.9	4.9	0.78	U	UJ
Acetone	N	µg/L	25	25	10	U	U	25	25	10	U	U	10	10	1.1	U	U
Benzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.13	U	U
Bromodichloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.15	U	U
Bromoform	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.64	U	U
Bromomethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	1	1	0.41	U	U
Butanone, 2-	N	µg/L	5	5	2	U	U	5	5	2	U	U	10	10	0.57	U	U
Carbon disulfide	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	1	1	0.13	U	U
Carbon tetrachloride	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.13	U	U
Chlorobenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.15	U	U
Chloroethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	1	1	0.29	U	U
Chloroform	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.16	U	U
Chloromethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	1	1	0.3	U	U
Cyclohexane	N	µg/L											1	1	0.12	U	U
Dibromo-3-chloropropane, 1,2-	N	µg/L											2	2	0.67	U	U
Dibromochloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.18	U	U
Dibromoethane, 1,2-	N	µg/L											1	1	0.24	U	U
Dichlorobenzene, 1,2-	N	µg/L											1	1	0.13	U	U
Dichlorobenzene, 1,3-	N	µg/L											1	1	0.14	U	U
Dichlorobenzene, 1,4-	N	µg/L											1	1	0.13	U	U
Dichlorodifluoromethane	N	µg/L											1	1	0.31	U	U
Dichloroethane, 1,1-	N	µg/L	1.7	1	0.25			1.6	1	0.25			1.3	1	0.15		
Dichloroethane, 1,2-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.22	U	U
Dichloroethene, 1,1-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U	1	1	0.19	U	U
Dichloroethene, cis-1,2-	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U	1	1	0.17	U	U
Dichloroethene, trans-1,2-	N	µg/L	1	1	0.35	U	U	1	1	0.35	U	U	1	1	0.19	U	U
Dichloropropane, 1,2-	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.18	U	U
Dichloropropene, cis-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.14	U	U
Dichloropropene, trans-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.19	U	U
Ethylbenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.17	U	U
Hexanone, 2-	N	µg/L	10	10	4	U	U	10	10	4	U	U	10	10	0.41	U	U
Isopropylbenzene	N	µg/L											1	1	0.13	U	U
METHYL ACETATE	N	µg/L											10	10	0.38	U	U
Methyl Tertiary Butyl Ether	N	µg/L											1	1	0.17	U	U
Methyl-2-pentanone, 4-	N	µg/L	5	5	2	U	U	5	5	2	U	U	10	10	0.32	U	U
Methylcyclohexane	N	µg/L											1	1	0.13	U	U
Methylene chloride	N	µg/L	5	5	2	U	U	5	5	2	U	U	1	1	0.33	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW01					AP3-MW01				
SAMPLE_NO			AP3083					AP3084					AP3085				
SAMPLE_DATE			19-Dec-11					19-Dec-11					19-Dec-11				
DEPTH			1_3 - 1_3 Ft					1_3 - 1_3 Ft					1_3 - 1_3 Ft				
SAMPLE_PURPOSE			REG					FD					FS				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Styrene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.11	U	U
Tetrachloroethane, 1,1,2,2-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U	1	1	0.18	U	U
Tetrachloroethene	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.29	U	U
Toluene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.13	U	U
Trichlorobenzene, 1,2,4-	N	µg/L											1	1	0.15	U	U
Trichloroethane, 1,1,1-	N	µg/L	0.27	1	0.2	J	J	0.26	1	0.2	J	J	1	1	0.22	U	U
Trichloroethane, 1,1,2-	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.27	U	U
Trichloroethene	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U	1	1	0.17	U	U
Trichlorofluoromethane	N	µg/L											1	1	0.21	U	U
Trichlorotrifluoroethane	N	µg/L											1	1	0.28	U	U
Vinyl chloride	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.22	U	U
Xylenes, total	N	µg/L	3	3	0.52	U	U	3	3	0.52	U	U	2	2	0.28	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW02					AP3-MW02				
SAMPLE_NO			AP3088					AP3086					AP3091				
SAMPLE_DATE			30-May-12					16-Dec-11					30-May-12				
DEPTH			0 - 0 Ft					10_02 - 10_19 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.08	U	U	0.4	0.4	0.16	U	U
Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Dinitrobenzene, 1,3-	N	µg/L	0.4	0.4	0.19	U	U	0.19	0.19	0.094	U	U	0.4	0.4	0.19	U	U
Dinitrotoluene, 2,4-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Dinitrotoluene, 2,6-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
HMX	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Nitrobenzene	N	µg/L	0.4	0.4	0.17	U	U	0.19	0.19	0.082	U	U	0.4	0.4	0.17	U	U
Nitrotoluene, 2-	N	µg/L	0.18	0.4	0.16	J	J	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Nitrotoluene, 3-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Nitrotoluene, 4-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
RDX	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Tetryl	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Trinitrobenzene, 1,3,5-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Trinitrotoluene, 2,4,6-	N	µg/L	0.4	0.4	0.16	U	U	0.19	0.19	0.078	U	U	0.4	0.4	0.16	U	U
Ferrous Iron	N	mg/L						0	0.042								
Alkalinity	N	mg/L															
Alkalinity, Carbonate	N	mg/L						392	5	2.5							
Chloride	N	mg/L						11	10	5							
Cyanide, total	N	mg/L						0.01	0.01	0.005	U	U					
Hardness (as CaCO3)	N	mg/L	479	23	0.66			644	23	0.66			568	23	0.66		
Nitrate-Nitrite	N	mg/L						0.53	0.1	0.05							
Sulfate	N	mg/L						305	10	5							
Total dissolved solids	N	mg/L						788	100	10							
Total suspended solids	N	mg/L						10	10	4	U	U					
Turbidity	N	NTU						1.2	1	1							
Aluminum	N	µg/L	71	200	20	B	J	200	200	24	U	U	40.2	200	20	B	J
Aluminum	Y	µg/L															
Antimony	N	µg/L	6	6	1	U	U	6	6	1	U	U	6	6	1	U	U
Antimony	Y	µg/L															
Arsenic	N	µg/L	9.9	10	1	B	J	10	10	1	U		5.2	10	1	B	J
Arsenic	Y	µg/L															
Barium	N	µg/L	110	200	1	B	J	220	200	4		J	113	200	1	B	J
Barium	Y	µg/L															
Beryllium	N	µg/L	4	4	0.1	U	U	4	4	0.1	U	U	4	4	0.1	U	U
Beryllium	Y	µg/L															
Cadmium	N	µg/L	5	5	0.1	U	U	5	5	0.1	U	U	5	5	0.1	U	U
Cadmium	Y	µg/L															
Calcium	N	µg/L	116000	1000	50			140000	1000	50		J	118000	1000	50		
Calcium	Y	µg/L															
Chromium	N	µg/L	10	10	1	U	U	1.3	10	1	B	J	10	10	1	U	U
Chromium	Y	µg/L															
Cobalt	N	µg/L	50	50	1	U	U	50	50	1	U	U	2.1	50	1	B	J
Cobalt	Y	µg/L															
Copper	N	µg/L	25	25	1	U	U	25	25	1	U	U	25	25	1	U	U
Copper	Y	µg/L															
Iron	N	µg/L	2240	300	34			300	300	23	U	U	661	300	34		
Iron	Y	µg/L															
Lead	N	µg/L	5	5	1	U	U	5	5	1	U	U	5	5	1	U	U
Lead	Y	µg/L															
Magnesium	N	µg/L	45900	5000	50			71600	5000	50		J	66300	5000	50		
Magnesium	Y	µg/L															
Manganese	N	µg/L	779	15	1			52	15	1			270	15	1		
Manganese	Y	µg/L															
Mercury	N	µg/L	1	1	0.04	U	U	1	1	0.071	U	U	1	1	0.04	U	U
Mercury	Y	µg/L															
Nickel	N	µg/L	40	40	1	U	U	40	40	1	U	U	40	40	1	U	U
Nickel	Y	µg/L															
Potassium	N	µg/L	4050	10000	50	B	J	3840	10000	50	B	J	5030	10000	50	B	J
Potassium	Y	µg/L															
Selenium	N	µg/L	10	10	2	U	U	10	10	2	U	U	10	10	2	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW02					AP3-MW02				
SAMPLE_NO			AP3088					AP3086					AP3091				
SAMPLE_DATE			30-May-12					16-Dec-11					30-May-12				
DEPTH			0 - 0 Ft					10_02 - 10_19 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Selenium	Y	µg/L															
Silver	N	µg/L	10	10	1	U	U	10	10	1	U	U	10	10	1	U	U
Silver	Y	µg/L															
Sodium	N	µg/L	20100	10000	750			23300	10000	850			40100	10000	750		
Sodium	Y	µg/L															
Thallium	N	µg/L	10	10	1	U	U	10	10	1.5	U	U	10	10	1	U	U
Thallium	Y	µg/L															
Vanadium	N	µg/L	50	50	1	U	U	2.1	50	1	B	J	50	50	1	U	U
Vanadium	Y	µg/L															
Zinc	N	µg/L	15.1	20	1	B	J	7.6	20	1	B	J	13	20	1	B	J
Zinc	Y	µg/L															
3-Methylphenol and 4-Methylphenol	N	µg/L						4.8	4.8	1.1	U	U					
Acenaphthene	N	µg/L						4.8	4.8	0.48	U	U					
Acenaphthylene	N	µg/L						4.8	4.8	0.48	U	U					
Acetophenone	N	µg/L															
Anthracene	N	µg/L						4.8	4.8	0.48	U	U					
Atrazine	N	µg/L															
Benzaldehyde	N	µg/L															
Benzo(a)anthracene	N	µg/L						4.8	4.8	0.48	U	U					
Benzo(a)pyrene	N	µg/L						4.8	4.8	0.48	U	U					
Benzo(b)fluoranthene	N	µg/L						4.8	4.8	0.48	U	U					
Benzo(ghi)perylene	N	µg/L						4.8	4.8	0.48	U	U					
Benzo(k)fluoranthene	N	µg/L						4.8	4.8	0.48	U	U					
Benzoic acid	N	µg/L						48	48	9.6	U	U					
Benzyl alcohol	N	µg/L						4.8	4.8	0.96	U	U					
Bibenzene	N	µg/L															
Bis(2-chloroethoxy)methane	N	µg/L						4.8	4.8	0.48	U	U					
Bis(2-chloroethyl)ether	N	µg/L						4.8	4.8	0.52	U	U					
Bis(2-chloroisopropyl)ether	N	µg/L						4.8	4.8	0.52	U	U					
Bis(2-ethylhexyl)phthalate	N	µg/L						4.8	4.8	1.1	U	U					
Bromophenyl phenyl ether, 4-	N	µg/L						4.8	4.8	0.48	U	U					
Butyl benzyl phthalate	N	µg/L						4.8	4.8	1.1	U	U					
Caprolactam	N	µg/L															
Carbazole	N	µg/L						4.8	4.8	0.48	U	U					
Chloro-3-methylphenol, 4-	N	µg/L						4.8	4.8	0.48	U	U					
Chloroaniline, 4-	N	µg/L						4.8	4.8	0.48	U	U					
Chloronaphthalene, 2-	N	µg/L						4.8	4.8	0.48	U	U					
Chlorophenol, 2-	N	µg/L						4.8	4.8	0.48	U	U					
Chlorophenyl phenyl ether, 4-	N	µg/L						4.8	4.8	0.48	U	U					
Chrysene	N	µg/L						4.8	4.8	0.48	U	U					
Dibenz(a,h)anthracene	N	µg/L						4.8	4.8	0.5	U	U					
Dibenzofuran	N	µg/L						4.8	4.8	0.48	U	U					
Dichlorobenzene, 1,2-	N	µg/L						4.8	4.8	0.96	U	U					
Dichlorobenzene, 1,3-	N	µg/L						4.8	4.8	0.96	U	U					
Dichlorobenzene, 1,4-	N	µg/L						4.8	4.8	0.96	U	U					
Dichlorobenzidine, 3,3'-	N	µg/L						9.6	9.6	0.96	U	U					
Dichlorophenol, 2,4-	N	µg/L						4.8	4.8	0.48	U	U					
Diethyl phthalate	N	µg/L						4.8	4.8	1.1	U	U					
Dimethyl phthalate	N	µg/L						4.8	4.8	0.95	U	U					
Dimethylphenol, 2,4-	N	µg/L						4.8	4.8	1.1	U	U					
Di-n-butyl phthalate	N	µg/L						4.8	4.8	0.84	U	U					
Dinitro-2-methylphenol, 4,6-	N	µg/L						9.6	9.6	1.9	U	U					
Dinitrophenol, 2,4-	N	µg/L						24	24	9.6	U	U					
Dinitrotoluene, 2,4-	N	µg/L						4.8	4.8	0.48	U	U					
Dinitrotoluene, 2,6-	N	µg/L						4.8	4.8	0.48	U	U					
Di-n-octyl phthalate	N	µg/L						4.8	4.8	1.1	U	U					
Fluoranthene	N	µg/L						4.8	4.8	0.48	U	U					
Fluorene	N	µg/L						4.8	4.8	0.48	U	U					
Hexachlorobenzene	N	µg/L						4.8	4.8	0.54	U	U					
Hexachlorobutadiene	N	µg/L						4.8	4.8	0.96	U	U					

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW02					AP3-MW02				
SAMPLE_NO			AP3088					AP3086					AP3091				
SAMPLE_DATE			30-May-12					16-Dec-11					30-May-12				
DEPTH			0 - 0 Ft					10_02 - 10_19 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Hexachlorocyclopentadiene	N	µg/L						9.6	9.6	1.8	U	U					
Hexachloroethane	N	µg/L						4.8	4.8	0.96	U	U					
Indeno(1,2,3-cd)pyrene	N	µg/L						4.8	4.8	0.48	U	U					
Isophorone	N	µg/L						4.8	4.8	0.48	U	U					
Methylnaphthalene, 2-	N	µg/L						4.8	4.8	0.55	U	U					
Methylphenol, 2-	N	µg/L						4.8	4.8	0.52	U	U					
Naphthalene	N	µg/L						4.8	4.8	0.77	U	U					
Nitroaniline, 2-	N	µg/L						4.8	4.8	0.48	U	U					
Nitroaniline, 3-	N	µg/L						4.8	4.8	0.48	U	U					
Nitroaniline, 4-	N	µg/L						4.8	4.8	0.48	U	U					
Nitrobenzene	N	µg/L						4.8	4.8	0.57	U	U					
Nitrophenol, 2-	N	µg/L						4.8	4.8	0.52	U	U					
Nitrophenol, 4-	N	µg/L						24	24	4.8	U	U					
n-Nitroso-di-n-propylamine	N	µg/L						4.8	4.8	0.48	U	U					
n-Nitrosodiphenylamine	N	µg/L						4.8	4.8	0.96	U	U					
Pentachlorophenol	N	µg/L						24	24	5.2	U	U					
Phenanthrene	N	µg/L						4.8	4.8	0.48	U	U					
Phenol	N	µg/L						4.8	4.8	0.48	U	U					
Pyrene	N	µg/L						4.8	4.8	0.48	U	U					
Trichlorobenzene, 1,2,4-	N	µg/L						4.8	4.8	0.48	U	U					
Trichlorophenol, 2,4,5-	N	µg/L						4.8	4.8	0.48	U	U					
Trichlorophenol, 2,4,6-	N	µg/L						4.8	4.8	0.48	U	U					
Acetone	N	µg/L	25	25	10	U	U	25	25	10	U	UJ	25	25	10	U	U
Benzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Bromodichloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Bromoform	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	UJ	1	1	0.2	U	U
Bromomethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	2	2	0.5	U	U
Butanone, 2-	N	µg/L	5	5	2	U	U	5	5	2	U	U	5	5	2	U	U
Carbon disulfide	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	2	2	0.5	U	U
Carbon tetrachloride	N	µg/L	1	1	0.25	U	UJ	1	1	0.25	U	U	1	1	0.25	U	UJ
Chlorobenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Chloroethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U	2	2	0.5	U	U
Chloroform	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.22	U	U
Chloromethane	N	µg/L	2	2	0.5	U	UJ	2	2	0.5	U	U	2	2	0.5	U	U
Cyclohexane	N	µg/L															
Dibromo-3-chloropropane, 1,2-	N	µg/L															
Dibromochloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Dibromoethane, 1,2-	N	µg/L															
Dichlorobenzene, 1,2-	N	µg/L															
Dichlorobenzene, 1,3-	N	µg/L															
Dichlorobenzene, 1,4-	N	µg/L															
Dichlorodifluoromethane	N	µg/L															
Dichloroethane, 1,1-	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.25	U	U
Dichloroethane, 1,2-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Dichloroethene, 1,1-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U	1	1	0.23	U	U
Dichloroethene, cis-1,2-	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U	1	1	0.26	U	U
Dichloroethene, trans-1,2-	N	µg/L	1	1	0.35	U	U	1	1	0.35	U	U	1	1	0.35	U	U
Dichloropropane, 1,2-	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.25	U	U
Dichloropropene, cis-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	UJ	1	1	0.2	U	U
Dichloropropene, trans-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	UJ	1	1	0.2	U	U
Ethylbenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Hexanone, 2-	N	µg/L	10	10	4	U	U	10	10	4	U	U	10	10	4	U	U
Isopropylbenzene	N	µg/L															
METHYL ACETATE	N	µg/L															
Methyl Tertiary Butyl Ether	N	µg/L															
Methyl-2-pentanone, 4-	N	µg/L	5	5	2	U	U	5	5	2	U	U	5	5	2	U	U
Methylcyclohexane	N	µg/L															
Methylene chloride	N	µg/L	5	5	2	U	U	5	5	2	U	U	5	5	2	U	UJ

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW01					AP3-MW02					AP3-MW02				
SAMPLE_NO			AP3088					AP3086					AP3091				
SAMPLE_DATE			30-May-12					16-Dec-11					30-May-12				
DEPTH			0 - 0 Ft					10_02 - 10_19 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Styrene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	UJ	1	1	0.2	U	U
Tetrachloroethane, 1,1,2,2-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U	1	1	0.23	U	U
Tetrachloroethene	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U	1	1	0.25	U	U
Toluene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Trichlorobenzene, 1,2,4-	N	µg/L															
Trichloroethane, 1,1,1-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U	1	1	0.2	U	U
Trichloroethane, 1,1,2-	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.22	U	U
Trichloroethene	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U	1	1	0.26	U	U
Trichlorofluoromethane	N	µg/L															
Trichlorotrifluoroethane	N	µg/L															
Vinyl chloride	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U	1	1	0.22	U	U
Xylenes, total	N	µg/L	3	3	0.52	U	U	3	3	0.52	U	U	3	3	0.52	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW03					AP3-MW03				
SAMPLE_NO			AP3087					AP3092				
SAMPLE_DATE			20-Dec-11					30-May-12				
DEPTH			7_22 - 7_41 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.2	0.2	0.082	U	U	0.4	0.4	0.16	U	U
Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Dinitrobenzene, 1,3-	N	µg/L	0.2	0.2	0.097	U	U	0.4	0.4	0.19	U	U
Dinitrotoluene, 2,4-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Dinitrotoluene, 2,6-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
HMX	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Nitrobenzene	N	µg/L	0.2	0.2	0.084	U	U	0.4	0.4	0.17	U	U
Nitrotoluene, 2-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Nitrotoluene, 3-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Nitrotoluene, 4-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
RDX	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Tetryl	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Trinitrobenzene, 1,3,5-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Trinitrotoluene, 2,4,6-	N	µg/L	0.2	0.2	0.08	U	U	0.4	0.4	0.16	U	U
Ferrous Iron	N	mg/L	0	0.042								
Alkalinity	N	mg/L										
Alkalinity, Carbonate	N	mg/L	398	5	2.5		J					
Chloride	N	mg/L	27	10	5							
Cyanide, total	N	mg/L	0.01	0.01	0.005	U	U					
Hardness (as CaCO3)	N	mg/L	613	23	0.66			619	23	0.66		
Nitrate-Nitrite	N	mg/L	0.42	0.1	0.05							
Sulfate	N	mg/L	538	20	10							
Total dissolved solids	N	mg/L	1210	100	10							
Total suspended solids	N	mg/L	8	10	4	B	J					
Turbidity	N	NTU	1	1	1	U	U					
Aluminum	N	µg/L	88.9	200	24	B	J	34.9	200	20	B	J
Aluminum	Y	µg/L	46.7	200	20	B	J					
Antimony	N	µg/L	6	6	1	U	U	6	6	1	U	U
Antimony	Y	µg/L	6	6	1	U	U					
Arsenic	N	µg/L	10	10	1	U	U	10	10	1	U	U
Arsenic	Y	µg/L	10	10	1	U	U					
Barium	N	µg/L	67	200	4	B	J	47.5	200	1	B	J
Barium	Y	µg/L	75.3	200	1	B	J					
Beryllium	N	µg/L	4	4	0.1	U	U	4	4	0.1	U	U
Beryllium	Y	µg/L	4	4	0.1	U	U					
Cadmium	N	µg/L	5	5	0.1	U	U	5	5	0.1	U	U
Cadmium	Y	µg/L	5	5	0.1	U	U					
Calcium	N	µg/L	161000	1000	50		J	157000	1000	50		
Calcium	Y	µg/L	169000	1000	50							
Chromium	N	µg/L	10	10	1	U	U	10	10	1	U	U
Chromium	Y	µg/L	10	10	1	U	U					
Cobalt	N	µg/L	50	50	1	U	U	1.6	50	1	B	J
Cobalt	Y	µg/L	50	50	1	U	U					
Copper	N	µg/L	25	25	1	U	U	25	25	1	U	U
Copper	Y	µg/L	25	25	1	U	U					
Iron	N	µg/L	300	300	23	U	UJ	631	300	34		
Iron	Y	µg/L	300	300	34	U	U					
Lead	N	µg/L	5	5	1	U	U	5	5	1	U	U
Lead	Y	µg/L	5	5	1	U	U					
Magnesium	N	µg/L	51200	5000	50		J	55200	5000	50		
Magnesium	Y	µg/L	54100	5000	50							
Manganese	N	µg/L	151	15	1			472	15	1		
Manganese	Y	µg/L	151	15	1							
Mercury	N	µg/L	1	1	0.071	U	U	1	1	0.04	U	U
Mercury	Y	µg/L	1	1	0.071	U	U					
Nickel	N	µg/L	2.4	40	1	B	J	40	40	1	U	U
Nickel	Y	µg/L	40	40	1	U	U					
Potassium	N	µg/L	11100	10000	50			4680	10000	50	B	J
Potassium	Y	µg/L	11300	10000	50							
Selenium	N	µg/L	10	10	2	U	U	10	10	2	U	U

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW03					AP3-MW03				
SAMPLE_NO			AP3087					AP3092				
SAMPLE_DATE			20-Dec-11					30-May-12				
DEPTH			7_22 - 7_41 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Selenium	Y	µg/L	2.9	10	2	B	J					
Silver	N	µg/L	10	10	1	U	U	10	10	1	U	U
Silver	Y	µg/L	10	10	1	U	U					
Sodium	N	µg/L	154000	40000	3400			105000	40000	3400		
Sodium	Y	µg/L	153000	40000	3000							
Thallium	N	µg/L	10	10	1.5	U	U	10	10	1	U	U
Thallium	Y	µg/L	10	10	1	U	U					
Vanadium	N	µg/L	2.1	50	1	B	J	50	50	1	U	U
Vanadium	Y	µg/L	2.4	50	1	B	J					
Zinc	N	µg/L	7.7	20	1	B	J	18.4	20	1	B	J
Zinc	Y	µg/L	20	20	1	U	U					
3-Methylphenol and 4-Methylphenol	N	µg/L	4.8	4.8	1	U	U					
Acenaphthene	N	µg/L	4.8	4.8	0.48	U	U					
Acenaphthylene	N	µg/L	4.8	4.8	0.48	U	U					
Acetophenone	N	µg/L										
Anthracene	N	µg/L	4.8	4.8	0.48	U	U					
Atrazine	N	µg/L										
Benzaldehyde	N	µg/L										
Benzo(a)anthracene	N	µg/L	4.8	4.8	0.48	U	U					
Benzo(a)pyrene	N	µg/L	4.8	4.8	0.48	U	U					
Benzo(b)fluoranthene	N	µg/L	4.8	4.8	0.48	U	U					
Benzo(ghi)perylene	N	µg/L	4.8	4.8	0.48	U	U					
Benzo(k)fluoranthene	N	µg/L	4.8	4.8	0.48	U	U					
Benzoic acid	N	µg/L	48	48	9.5	U	U					
Benzyl alcohol	N	µg/L	4.8	4.8	0.95	U	U					
Bibenzene	N	µg/L										
Bis(2-chloroethoxy)methane	N	µg/L	4.8	4.8	0.48	U	U					
Bis(2-chloroethyl)ether	N	µg/L	4.8	4.8	0.51	U	U					
Bis(2-chloroisopropyl)ether	N	µg/L	4.8	4.8	0.51	U	U					
Bis(2-ethylhexyl)phthalate	N	µg/L	4.8	4.8	1	U	U					
Bromophenyl phenyl ether, 4-	N	µg/L	4.8	4.8	0.48	U	U					
Butyl benzyl phthalate	N	µg/L	4.8	4.8	1	U	U					
Caprolactam	N	µg/L										
Carbazole	N	µg/L	4.8	4.8	0.48	U	U					
Chloro-3-methylphenol, 4-	N	µg/L	4.8	4.8	0.48	U	U					
Chloroaniline, 4-	N	µg/L	4.8	4.8	0.48	U	U					
Chloronaphthalene, 2-	N	µg/L	4.8	4.8	0.48	U	U					
Chlorophenol, 2-	N	µg/L	4.8	4.8	0.48	U	U					
Chlorophenyl phenyl ether, 4-	N	µg/L	4.8	4.8	0.48	U	U					
Chrysene	N	µg/L	4.8	4.8	0.48	U	U					
Dibenz(a,h)anthracene	N	µg/L	4.8	4.8	0.5	U	U					
Dibenzofuran	N	µg/L	4.8	4.8	0.48	U	U					
Dichlorobenzene, 1,2-	N	µg/L	4.8	4.8	0.95	U	U					
Dichlorobenzene, 1,3-	N	µg/L	4.8	4.8	0.95	U	U					
Dichlorobenzene, 1,4-	N	µg/L	4.8	4.8	0.95	U	U					
Dichlorobenzidine, 3,3'-	N	µg/L	9.5	9.5	0.95	U	U					
Dichlorophenol, 2,4-	N	µg/L	4.8	4.8	0.48	U	U					
Diethyl phthalate	N	µg/L	4.8	4.8	1	U	U					
Dimethyl phthalate	N	µg/L	4.8	4.8	0.94	U	U					
Dimethylphenol, 2,4-	N	µg/L	4.8	4.8	1	U	U					
Di-n-butyl phthalate	N	µg/L	4.8	4.8	0.83	U	U					
Dinitro-2-methylphenol, 4,6-	N	µg/L	9.5	9.5	1.9	U	U					
Dinitrophenol, 2,4-	N	µg/L	24	24	9.5	U	U					
Dinitrotoluene, 2,4-	N	µg/L	4.8	4.8	0.48	U	U					
Dinitrotoluene, 2,6-	N	µg/L	4.8	4.8	0.48	U	U					
Di-n-octyl phthalate	N	µg/L	4.8	4.8	1	U	U					
Fluoranthene	N	µg/L	4.8	4.8	0.48	U	U					
Fluorene	N	µg/L	4.8	4.8	0.48	U	U					
Hexachlorobenzene	N	µg/L	4.8	4.8	0.53	U	U					
Hexachlorobutadiene	N	µg/L	4.8	4.8	0.95	U	U					

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW03					AP3-MW03				
SAMPLE_NO			AP3087					AP3092				
SAMPLE_DATE			20-Dec-11					30-May-12				
DEPTH			7_22 - 7_41 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Hexachlorocyclopentadiene	N	µg/L	9.5	9.5	1.8	U	U					
Hexachloroethane	N	µg/L	4.8	4.8	0.95	U	U					
Indeno(1,2,3-cd)pyrene	N	µg/L	4.8	4.8	0.48	U	U					
Isophorone	N	µg/L	4.8	4.8	0.48	U	U					
Methylnaphthalene, 2-	N	µg/L	4.8	4.8	0.54	U	U					
Methylphenol, 2-	N	µg/L	4.8	4.8	0.51	U	U					
Naphthalene	N	µg/L	4.8	4.8	0.76	U	U					
Nitroaniline, 2-	N	µg/L	4.8	4.8	0.48	U	U					
Nitroaniline, 3-	N	µg/L	4.8	4.8	0.48	U	U					
Nitroaniline, 4-	N	µg/L	4.8	4.8	0.48	U	U					
Nitrobenzene	N	µg/L	4.8	4.8	0.56	U	U					
Nitrophenol, 2-	N	µg/L	4.8	4.8	0.51	U	U					
Nitrophenol, 4-	N	µg/L	24	24	4.8	U	U					
n-Nitroso-di-n-propylamine	N	µg/L	4.8	4.8	0.48	U	U					
n-Nitrosodiphenylamine	N	µg/L	4.8	4.8	0.95	U	U					
Pentachlorophenol	N	µg/L	24	24	5.1	U	U					
Phenanthrene	N	µg/L	4.8	4.8	0.48	U	U					
Phenol	N	µg/L	4.8	4.8	0.48	U	U					
Pyrene	N	µg/L	4.8	4.8	0.48	U	U					
Trichlorobenzene, 1,2,4-	N	µg/L	4.8	4.8	0.48	U	U					
Trichlorophenol, 2,4,5-	N	µg/L	4.8	4.8	0.48	U	U					
Trichlorophenol, 2,4,6-	N	µg/L	4.8	4.8	0.48	U	U					
Acetone	N	µg/L	17.6	25	10	J	J	25	25	10	U	U
Benzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Bromodichloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Bromoform	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Bromomethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U
Butanone, 2-	N	µg/L	5	5	2	U	U	5	5	2	U	U
Carbon disulfide	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U
Carbon tetrachloride	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	UJ
Chlorobenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Chloroethane	N	µg/L	2	2	0.5	U	U	2	2	0.5	U	U
Chloroform	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U
Chloromethane	N	µg/L	1.6	2	0.5	J	J	2	2	0.5	U	U
Cyclohexane	N	µg/L										
Dibromo-3-chloropropane, 1,2-	N	µg/L										
Dibromochloromethane	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Dibromoethane, 1,2-	N	µg/L										
Dichlorobenzene, 1,2-	N	µg/L										
Dichlorobenzene, 1,3-	N	µg/L										
Dichlorobenzene, 1,4-	N	µg/L										
Dichlorodifluoromethane	N	µg/L										
Dichloroethane, 1,1-	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U
Dichloroethane, 1,2-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Dichloroethene, 1,1-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U
Dichloroethene, cis-1,2-	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U
Dichloroethene, trans-1,2-	N	µg/L	1	1	0.35	U	U	1	1	0.35	U	U
Dichloropropane, 1,2-	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U
Dichloropropene, cis-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Dichloropropene, trans-1,3-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Ethylbenzene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Hexanone, 2-	N	µg/L	10	10	4	U	U	10	10	4	U	U
Isopropylbenzene	N	µg/L										
METHYL ACETATE	N	µg/L										
Methyl Tertiary Butyl Ether	N	µg/L										
Methyl-2-pentanone, 4-	N	µg/L	5	5	2	U	U	5	5	2	U	U
Methylcyclohexane	N	µg/L										
Methylene chloride	N	µg/L	5	5	2	U	U	5	5	2	U	UJ

Table A-3

Groundwater Data Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works
Sandusky, Ohio

LOCATION_CODE			AP3-MW03					AP3-MW03				
SAMPLE_NO			AP3087					AP3092				
SAMPLE_DATE			20-Dec-11					30-May-12				
DEPTH			7_22 - 7_41 Ft					0 - 0 Ft				
SAMPLE_PURPOSE			REG					REG				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Styrene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Tetrachloroethane, 1,1,2,2-	N	µg/L	1	1	0.23	U	U	1	1	0.23	U	U
Tetrachloroethene	N	µg/L	1	1	0.25	U	U	1	1	0.25	U	U
Toluene	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Trichlorobenzene, 1,2,4-	N	µg/L										
Trichloroethane, 1,1,1-	N	µg/L	1	1	0.2	U	U	1	1	0.2	U	U
Trichloroethane, 1,1,2-	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U
Trichloroethene	N	µg/L	1	1	0.26	U	U	1	1	0.26	U	U
Trichlorofluoromethane	N	µg/L										
Trichlorotrifluoroethane	N	µg/L										
Vinyl chloride	N	µg/L	1	1	0.22	U	U	1	1	0.22	U	U
Xylenes, total	N	µg/L	3	3	0.52	U	U	3	3	0.52	U	U

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
µg/L - micrograms per liter
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

Table A-4

Sediment Samples Used in the Baseline Human Health RIsk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		AP3-SD01					AP3-SD02					AP3-SD03				
SAMPLE_NO		AP1009					AP1010					AP1011				
SAMPLE_DATE		23-May-09					23-May-09					23-May-09				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.16	0.16	0.041	U	U	0.18	0.18	0.045	U	U	0.18	0.18	0.045	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.16	0.16	0.089	U	U	0.18	0.18	0.099	U	U	0.18	0.18	0.099	U	U
Dinitrobenzene, 1,3-	mg/kg	0.16	0.16	0.043	U	U	0.18	0.18	0.048	U	U	0.18	0.18	0.048	U	U
Dinitrotoluene, 2,4-	mg/kg	0.16	0.16	0.049	U	U	0.18	0.18	0.055	U	U	0.18	0.18	0.055	U	U
Dinitrotoluene, 2,6-	mg/kg	0.16	0.16	0.043	U	U	0.18	0.18	0.048	U	U	0.18	0.18	0.048	U	U
HMX	mg/kg	0.16	0.16	0.07	U	U	0.18	0.18	0.078	U	U	0.18	0.18	0.078	U	U
Nitrobenzene	mg/kg	0.16	0.16	0.054	U	U	0.18	0.18	0.06	U	U	0.18	0.18	0.06	U	U
Nitrotoluene, 2-	mg/kg	0.16	0.16	0.041	U	U	0.18	0.18	0.045	U	U	0.18	0.18	0.045	U	U
Nitrotoluene, 3-	mg/kg	0.16	0.16	0.069	U	U	0.18	0.18	0.076	U	U	0.18	0.18	0.076	U	U
Nitrotoluene, 4-	mg/kg	0.16	0.16	0.051	U	U	0.18	0.18	0.056	U	U	0.18	0.18	0.056	U	U
RDX	mg/kg	0.16	0.16	0.07	U	U	0.18	0.18	0.077	U	U	0.18	0.18	0.077	U	U
Tetryl	mg/kg	0.16	0.16	0.042	U	U	0.18	0.18	0.046	U	U	0.18	0.18	0.046	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.16	0.16	0.041	U	U	0.18	0.18	0.045	U	U	0.18	0.18	0.045	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.16	0.16	0.041	U	U	0.18	0.18	0.045	U	U	0.18	0.18	0.045	U	U
% Solids	Percent	54.3	0				55.4	0				68.4	0			
Total organic carbon	mg/kg	28000	0.4	0.4												
Aluminum	mg/kg	3610	18	0.99												
Antimony	mg/kg	0.54	5.4	0.41	B	J										
Arsenic	mg/kg	6.4	0.72	0.32												
Barium	mg/kg	26.6	18	0.45												
Beryllium	mg/kg	0.26	0.45	0.09	B	J										
Cadmium	mg/kg	0.3	0.36	0.09	B	J										
Calcium	mg/kg	9610	450	9		J										
Chromium	mg/kg	6.4	0.9	0.14												
Cobalt	mg/kg	4.1	4.5	0.075	B	J										
Copper	mg/kg	126	2.3	0.19												
Iron	mg/kg	13000	9	2.1		J										
Lead	mg/kg	8.7	9	0.18	B	J										
Magnesium	mg/kg	4370	450	9		J										
Manganese	mg/kg	130	1.4	0.045		J										
Mercury	mg/kg	0.027	0.14	0.021	B	J										
Nickel	mg/kg	10.5	3.6	0.21		J										
Potassium	mg/kg	337	1800	9	B	J										
Selenium	mg/kg	0.54	9	0.28	B	B										
Silver	mg/kg	0.9	0.9	0.11	U	U										
Sodium	mg/kg	900	900	45	U	U										
Thallium	mg/kg	9	9	3.1	U	U										
Vanadium	mg/kg	11.3	4.5	0.06												
Zinc	mg/kg	52.8	1.8	0.34		J										
Aroclor 1016	mg/kg	0.031	0.031	0.015	U	U	0.03	0.03	0.015	U	U	0.024	0.024	0.012	U	U
Aroclor 1221	mg/kg	0.031	0.031	0.025	U	U	0.03	0.03	0.024	U	U	0.024	0.024	0.019	U	U
Aroclor 1232	mg/kg	0.031	0.031	0.025	U	U	0.03	0.03	0.024	U	U	0.024	0.024	0.019	U	U
Aroclor 1242	mg/kg	0.031	0.031	0.015	U	U	0.03	0.03	0.015	U	U	0.024	0.024	0.012	U	U
Aroclor 1248	mg/kg	0.031	0.031	0.015	U	U	0.03	0.03	0.015	U	U	0.024	0.024	0.012	U	U
Aroclor 1254	mg/kg	0.031	0.031	0.015	U	U	0.03	0.03	0.015	U	U	0.024	0.024	0.012	U	U
Aroclor 1260	mg/kg	0.031	0.031	0.015	U	U	0.03	0.03	0.015	U	U	0.024	0.024	0.012	U	U
3-Methylphenol and 4-Methylphenol	mg/kg	0.31	0.31	0.061	U	U										
Acenaphthene	mg/kg	0.31	0.31	0.061	U	U										
Acenaphthylene	mg/kg	0.31	0.31	0.061	U	U										
Anthracene	mg/kg	0.31	0.31	0.061	U	U										
Benzo(a)anthracene	mg/kg	0.143	0.31	0.061	J	J										
Benzo(a)pyrene	mg/kg	0.158	0.31	0.061	J	J										
Benzo(b)fluoranthene	mg/kg	0.24	0.31	0.061	J	J										
Benzo(ghi)perylene	mg/kg	0.101	0.31	0.061	J	J										
Benzo(k)fluoranthene	mg/kg	0.0805	0.31	0.061	J	J										
Benzoic acid	mg/kg	1.5	1.5	0.61	U	U										
Benzyl alcohol	mg/kg	0.31	0.31	0.061	U	U										
Bis(2-chloroethoxy)methane	mg/kg	0.31	0.31	0.061	U	U										
Bis(2-chloroethyl)ether	mg/kg	0.31	0.31	0.061	U	U										
Bis(2-chloroisopropyl)ether	mg/kg	0.31	0.31	0.061	U	U										
Bis(2-ethylhexyl)phthalate	mg/kg	0.61	0.61	0.31	U	U										
Bromophenyl phenyl ether, 4-	mg/kg	0.31	0.31	0.061	U	U										
Butyl benzyl phthalate	mg/kg	0.61	0.61	0.12	U	U										

Table A-4

Sediment Samples Used in the Baseline Human Health RIsk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		AP3-SD01					AP3-SD02					AP3-SD03				
SAMPLE_NO		AP1009					AP1010					AP1011				
SAMPLE_DATE		23-May-09					23-May-09					23-May-09				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.16	0.16	0.041	U	U	0.18	0.18	0.045	U	U	0.18	0.18	0.045	U	U
Carbazole	mg/kg	0.31	0.31	0.061	U	U										
Chloro-3-methylphenol, 4-	mg/kg	0.31	0.31	0.061	U	U										
Chloroaniline, 4-	mg/kg	0.31	0.31	0.12	U	U										
Chloronaphthalene, 2-	mg/kg	0.31	0.31	0.061	U	U										
Chlorophenol, 2-	mg/kg	0.31	0.31	0.061	U	U										
Chlorophenyl phenyl ether, 4-	mg/kg	0.31	0.31	0.061	U	U										
Chrysene	mg/kg	0.159	0.31	0.061	J	J										
Dibenz(a,h)anthracene	mg/kg	0.31	0.31	0.061	U	U										
Dibenzofuran	mg/kg	0.31	0.31	0.061	U	U										
Dichlorobenzene, 1,2-	mg/kg	0.31	0.31	0.08	U	U										
Dichlorobenzene, 1,3-	mg/kg	0.31	0.31	0.08	U	U										
Dichlorobenzene, 1,4-	mg/kg	0.31	0.31	0.074	U	U										
Dichlorobenzidine, 3,3'-	mg/kg	0.61	0.61	0.12	U	U										
Dichlorophenol, 2,4-	mg/kg	0.31	0.31	0.061	U	U										
Diethyl phthalate	mg/kg	0.61	0.61	0.31	U	U										
Dimethyl phthalate	mg/kg	0.61	0.61	0.12	U	U										
Dimethylphenol, 2,4-	mg/kg	0.31	0.31	0.061	U	U										
Di-n-butyl phthalate	mg/kg	0.61	0.61	0.12	U	U										
Dinitro-2-methylphenol, 4,6-	mg/kg	0.61	0.61	0.2	U	U										
Dinitrophenol, 2,4-	mg/kg	1.5	1.5	0.61	U	UJ										
Dinitrotoluene, 2,4-	mg/kg	0.31	0.31	0.061	U	U										
Dinitrotoluene, 2,6-	mg/kg	0.31	0.31	0.061	U	U										
Di-n-octyl phthalate	mg/kg	0.61	0.61	0.12	U	U										
Fluoranthene	mg/kg	0.253	0.31	0.061	J	J										
Fluorene	mg/kg	0.31	0.31	0.061	U	U										
Hexachlorobenzene	mg/kg	0.31	0.31	0.061	U	U										
Hexachlorobutadiene	mg/kg	0.31	0.31	0.061	U	U										
Hexachlorocyclopentadiene	mg/kg	0.31	0.31	0.061	U	U										
Hexachloroethane	mg/kg	0.31	0.31	0.074	U	U										
Indeno(1,2,3-cd)pyrene	mg/kg	0.111	0.31	0.061	J	J										
Isophorone	mg/kg	0.31	0.31	0.061	U	U										
Methylnaphthalene, 2-	mg/kg	0.31	0.31	0.061	U	U										
Methylphenol, 2-	mg/kg	0.31	0.31	0.061	U	U										
Methylphenol, 4-	mg/kg															
Naphthalene	mg/kg	0.31	0.31	0.061	U	U										
Nitroaniline, 2-	mg/kg	0.61	0.61	0.12	U	U										
Nitroaniline, 3-	mg/kg	0.61	0.61	0.12	U	U										
Nitroaniline, 4-	mg/kg	0.61	0.61	0.12	U	U										
Nitrobenzene	mg/kg	0.31	0.31	0.061	U	U										
Nitrophenol, 2-	mg/kg	0.31	0.31	0.061	U	U										
Nitrophenol, 4-	mg/kg	1.5	1.5	0.61	U	U										
n-Nitroso-di-n-propylamine	mg/kg	0.31	0.31	0.061	U	U										
n-Nitrosodiphenylamine	mg/kg	0.31	0.31	0.12	U	U										
Pentachlorophenol	mg/kg	1.5	1.5	0.61	U	U										
Phenanthrene	mg/kg	0.31	0.31	0.061	U	U										
Phenol	mg/kg	0.31	0.31	0.061	U	U										
Pyrene	mg/kg	0.206	0.31	0.061	J	J										
Trichlorobenzene, 1,2,4-	mg/kg	0.31	0.31	0.061	U	U										
Trichlorophenol, 2,4,5-	mg/kg	0.31	0.31	0.061	U	U										
Trichlorophenol, 2,4,6-	mg/kg	0.31	0.31	0.061	U	U										

Table A-4

Sediment Samples Used in the Baseline Human Health RIsk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		PBOW99-SDA302					PBOW99-SDA303					PBOW99-SDA303				
SAMPLE_NO		PBOW99SDA302					PBOW99SDA303					PBOW99SDA303DUP				
SAMPLE_DATE		11-Jun-99					11-Jun-99					11-Jun-99				
SAMPLE_PURPOSE		REG					REG					FD				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg															
Amino-4,6-dinitrotoluene, 2-	mg/kg															
Dinitrobenzene, 1,3-	mg/kg															
Dinitrotoluene, 2,4-	mg/kg															
Dinitrotoluene, 2,6-	mg/kg															
HMX	mg/kg															
Nitrobenzene	mg/kg															
Nitrotoluene, 2-	mg/kg															
Nitrotoluene, 3-	mg/kg															
Nitrotoluene, 4-	mg/kg															
RDX	mg/kg															
Tetryl	mg/kg															
Trinitrobenzene, 1,3,5-	mg/kg															
Trinitrotoluene, 2,4,6-	mg/kg															
% Solids	Percent															
Total organic carbon	mg/kg															
Aluminum	mg/kg	7750	33.1	33.1			1800	29.8	29.8		J	3150	30.9	30.9		
Antimony	mg/kg	1.7	1.7	1.7	U		1.5	1.5	1.5	U		1.5	1.5	1.5	U	
Arsenic	mg/kg	5.9	1.7	1.7			3.6	1.5	1.5			3.8	1.5	1.5		
Barium	mg/kg	47.8	33.1	33.1			29.8	29.8	29.8	U		30.9	30.9	30.9	U	
Beryllium	mg/kg	0.83	0.83	0.83	U		0.74	0.74	0.74	U		0.77	0.77	0.77	U	
Cadmium	mg/kg	0.33	0.33	0.33	U		0.3	0.3	0.3	U		0.31	0.31	0.31	U	
Calcium	mg/kg	18100	828	828			4560	744	744			5620	773	773		
Chromium	mg/kg	10.8	0.83	0.83			5.6	0.74	0.74			5.2	0.77	0.77		
Cobalt	mg/kg	8.3	8.3	8.3	U		7.4	7.4	7.4	U		7.7	7.7	7.7	U	
Copper	mg/kg	14.4	4.1	4.1			71.8	3.7	3.7			76.2	3.9	3.9		
Iron	mg/kg	12800	16.6	16.6			5880	14.9	14.9			7540	15.5	15.5		
Lead	mg/kg	11.9	0.5	0.5			5.1	0.45	0.45			8.3	0.46	0.46		
Magnesium	mg/kg	5670	828	828			2220	744	744			2920	773	773		
Manganese	mg/kg	318	2.5	2.5			122	2.2	2.2			159	2.3	2.3		
Mercury	mg/kg	0.17	0.17	0.17	U		0.15	0.15	0.15	U		0.15	0.15	0.15	U	
Nickel	mg/kg	12.5	6.6	6.6			6.3	6	6			6.8	6.2	6.2		
Potassium	mg/kg	1270	828	828			744	744	744	U		773	773	773	U	
Selenium	mg/kg	1.1	0.83	0.83			0.74	0.74	0.74	U		0.77	0.77	0.77	U	
Silver	mg/kg	0.83	0.83	0.83	U		0.74	0.74	0.74	U		0.77	0.77	0.77	U	
Sodium	mg/kg	828	828	828	U		744	744	744	U		773	773	773	U	
Thallium	mg/kg	1.7	1.7	1.7	U		1.5	1.5	1.5	U		1.5	1.5	1.5	U	
Vanadium	mg/kg	19.3	8.3	8.3			7.4	7.4	7.4	U		9.4	7.7	7.7		
Zinc	mg/kg	48.3	3.3	3.3	MBD		24.4	3	3	MBD		28.2	3.1	3.1	MBD	
Aroclor 1016	mg/kg															
Aroclor 1221	mg/kg															
Aroclor 1232	mg/kg															
Aroclor 1242	mg/kg															
Aroclor 1248	mg/kg															
Aroclor 1254	mg/kg															
Aroclor 1260	mg/kg															
3-Methylphenol and 4-Methylphenol	mg/kg															
Acenaphthene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Acenaphthylene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Anthracene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzo(a)anthracene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzo(a)pyrene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzo(b)fluoranthene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzo(ghi)perylene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzo(k)fluoranthene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Benzoic acid	mg/kg															
Benzyl alcohol	mg/kg															
Bis(2-chloroethoxy)methane	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Bis(2-chloroethyl)ether	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Bis(2-chloroisopropyl)ether	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Bis(2-ethylhexyl)phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Bromophenyl phenyl ether, 4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Butyl benzyl phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ

Table A-4

Sediment Samples Used in the Baseline Human Health RIsk Assessment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		PBOW99-SDA302					PBOW99-SDA303					PBOW99-SDA303				
SAMPLE_NO		PBOW99SDA302					PBOW99SDA303					PBOW99SDA303DUP				
SAMPLE_DATE		11-Jun-99					11-Jun-99					11-Jun-99				
SAMPLE_PURPOSE		REG					REG					FD				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	mg/kg															
Carbazole	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chloro-3-methylphenol, 4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chloroaniline, 4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chloronaphthalene, 2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chlorophenol, 2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chlorophenyl phenyl ether, 4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Chrysene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dibenz(a,h)anthracene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dibenzofuran	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dichlorobenzene, 1,2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dichlorobenzene, 1,3-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dichlorobenzene, 1,4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dichlorobenzidine, 3,3'-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dichlorophenol, 2,4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Diethyl phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dimethyl phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dimethylphenol, 2,4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Di-n-butyl phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dinitro-2-methylphenol, 4,6-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Dinitrophenol, 2,4-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Dinitrotoluene, 2,4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Dinitrotoluene, 2,6-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Di-n-octyl phthalate	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Fluoranthene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Fluorene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Hexachlorobenzene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Hexachlorobutadiene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Hexachlorocyclopentadiene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Hexachloroethane	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Indeno(1,2,3-cd)pyrene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Isophorone	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Methylnaphthalene, 2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Methylphenol, 2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Methylphenol, 4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Naphthalene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Nitroaniline, 2-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Nitroaniline, 3-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Nitroaniline, 4-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Nitrobenzene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Nitrophenol, 2-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Nitrophenol, 4-	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
n-Nitroso-di-n-propylamine	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
n-Nitrosodiphenylamine	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Pentachlorophenol	mg/kg	1.3	1.3	1.3	U	UJ	1.2	1.2	1.2	U	UJ	1.2	1.2	1.2	U	UJ
Phenanthrene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Phenol	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Pyrene	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Trichlorobenzene, 1,2,4-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Trichlorophenol, 2,4,5-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ
Trichlorophenol, 2,4,6-	mg/kg	0.55	0.55	0.55	U	UJ	0.49	0.49	0.49	U	UJ	0.51	0.51	0.51	U	UJ

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligram(s) per kilogram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

Table A-5

Surface Water Samples Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnancne Works, Sandusky, Ohio

LOCATION_CODE			AP3-SW01					AP3-SW02					AP3-SW03					PBOW99-SWA301					PBOW99-SWA302					PBOW99-SWA303					PBOW99-SWA303				
SAMPLE_NO			AP2009					AP2010					AP2011A					PBOW99SWA301					PBOW99SWA302					PBOW99SWA303					PBOW99SWA303DUP				
SAMPLE_DATE			23-May-09					23-May-09					27-May-09					11-Jun-99					11-Jun-99					11-Jun-99					11-Jun-99				
SAMPLE_PURPOSE			REG					REG					REG					REG					REG					REG					FD				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	0.19	0.048	U	UJ	0.19	0.19	0.048	U	U	0.19	0.19	0.049	U	U																				
Amino-4,6-dinitrotoluene, 2-	N	µg/L	0.19	0.19	0.073	U	UJ	0.19	0.19	0.073	U	U	0.19	0.19	0.075	U	U																				
Dinitrobenzene, 1,3-	N	µg/L	0.19	0.19	0.049	U	UJ	0.19	0.19	0.049	U	U	0.19	0.19	0.05	U	U																				
Dinitrotoluene, 2,4-	N	µg/L	0.19	0.19	0.062	U	UJ	0.19	0.19	0.062	U	U	0.19	0.19	0.063	U	U																				
Dinitrotoluene, 2,6-	N	µg/L	0.19	0.19	0.089	U	UJ	0.19	0.19	0.089	U	U	0.19	0.19	0.09	U	U																				
HMX	N	µg/L	0.19	0.19	0.1	U	UJ	0.19	0.19	0.1	U	U	0.19	0.19	0.11	U	U																				
Nitrobenzene	N	µg/L	0.19	0.19	0.048	U	UJ	0.19	0.19	0.048	U	U	0.19	0.19	0.049	U	U																				
Nitrotoluene, 2-	N	µg/L	0.19	0.19	0.061	U	UJ	0.19	0.19	0.061	U	U	0.19	0.19	0.062	U	U																				
Nitrotoluene, 3-	N	µg/L	0.19	0.19	0.092	U	UJ	0.19	0.19	0.092	U	U	0.19	0.19	0.094	U	U																				
Nitrotoluene, 4-	N	µg/L	0.19	0.19	0.072	U	UJ	0.19	0.19	0.072	U	U	0.19	0.19	0.074	U	U																				
RDX	N	µg/L	0.19	0.19	0.071	U	UJ	0.19	0.19	0.071	U	U	0.19	0.19	0.073	U	U																				
Tetryl	N	µg/L	0.19	0.19	0.074	U	UJ	0.19	0.19	0.074	U	U	0.19	0.19	0.076	U	U																				
Trinitrobenzene, 1,3,5-	N	µg/L	0.19	0.19	0.048	U	UJ	0.19	0.19	0.048	U	U	0.19	0.19	0.049	U	U																				
Trinitrotoluene, 2,4,6-	N	µg/L	0.19	0.19	0.066	U	UJ	0.19	0.19	0.066	U	U	0.19	0.19	0.067	U	U																				
Aluminum	N	µg/L																200	200	200	U		200	200	200	U		200	200	200	U		200	200	200	U	
Antimony	N	µg/L																10	10	10	U		10	10	10	U		10	10	10	U		10	10	10	U	
Arsenic	N	µg/L																10	10	10	U		10	10	10	U		10	10	10	U		10	10	10	U	
Barium	N	µg/L																200	200	200	U		200	200	200	U		200	200	200	U		200	200	200	U	
Beryllium	N	µg/L																5	5	5	U		5	5	5	U		5	5	5	U		5	5	5	U	
Cadmium	N	µg/L																2	2	2	U		2	2	2	U		2	2	2	U		2	2	2	U	
Calcium	N	µg/L																27900	5000	5000			27700	5000	5000			24400	5000	5000			24500	5000	5000		
Chromium	N	µg/L																5	5	5	U		5	5	5	U		5	5	5	U		5	5	5	U	
Cobalt	N	µg/L																50	50	50	U		50	50	50	U		50	50	50	U		50	50	50	U	
Copper	N	µg/L																25	25	25	U		25	25	25	U		25	25	25	U		25	25	25	U	
Iron	N	µg/L																687	100	100	MBD	U	429	100	100	MBD	U	431	100	100	MBD	U	251	100	100	MBD	U
Lead	N	µg/L																3	3	3	U		3	3	3	U		3	3	3	U		3	3	3	U	
Magnesium	N	µg/L																9410	5000	5000			9470	5000	5000			8940	5000	5000			9040	5000	5000		
Manganese	N	µg/L																195	15	15			153	15	15			48.4	15	15		J	34.9	15	15		
Mercury	N	µg/L																0.2	0.2	0.2	U		0.2	0.2	0.2	U		0.2	0.2	0.2	U		0.2	0.2	0.2	U	
Nickel	N	µg/L																40	40	40	U		40	40	40	U		40	40	40	U		40	40	40	U	
Potassium	N	µg/L																5000	5000	5000	U		5000	5000	5000	U		5000	5000	5000	U		5000	5000	5000	U	
Selenium	N	µg/L																5	5	5	U		5	5	5	U		5	5	5	U		5	5	5	U	
Silver	N	µg/L																5	5	5	U		5	5	5	U		5	5	5	U		5	5	5	U	
Sodium	N	µg/L																9740	5000	5000			9840	5000	5000	U		10200	5000	5000			10500	5000	5000		
Thallium	N	µg/L																10	10	10	U		10	10	10	U		10	10	10	U		10	10	10	U	
Vanadium	N	µg/L																50	50	50	U		50	50	50	U		50	50	50	U		50	50	50	U	
Zinc	N	µg/L																20	20	20	U		20	20	20	U		20	20	20	U		20	20	20	U	
Acenaphthene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Acenaphthylene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Anthracene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Benzo(a)anthracene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Benzo(a)pyrene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Benzo(b)fluoranthene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Benzo(ghi)perylene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Benzo(k)fluoranthene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Bis(2-chloroethoxy)methane	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Bis(2-chloroethyl)ether	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Bis(2-chloroisopropyl)ether	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Bis(2-ethylhexyl)phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Bromophenyl phenyl ether, 4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Butyl benzyl phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Carbazole	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chloro-3-methylphenol, 4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chloroaniline, 4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chloronaphthalene, 2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chlorophenol, 2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chlorophenyl phenyl ether, 4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Chrysene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dibenz(a,h)anthracene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ

Table A-5

Surface Water Samples Used in the Baseline Human Health Risk Assessment
Ash Pit No. 3
Former Plum Brook Ordnancne Works, Sandusky, Ohio

LOCATION_CODE			AP3-SW01					AP3-SW02					AP3-SW03					PBOW99-SWA301					PBOW99-SWA302					PBOW99-SWA303					PBOW99-SWA303				
SAMPLE_NO			AP2009					AP2010					AP2011A					PBOW99SWA301					PBOW99SWA302					PBOW99SWA303					PBOW99SWA303DUP				
SAMPLE_DATE			23-May-09					23-May-09					27-May-09					11-Jun-99					11-Jun-99					11-Jun-99					11-Jun-99				
SAMPLE_PURPOSE			REG					REG					REG					REG					REG					REG					FD				
Parameter	Filtered	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
Amino-2,6-dinitrotoluene, 4-	N	µg/L	0.19	0.19	0.048	U	UJ	0.19	0.19	0.048	U	U	0.19	0.19	0.049	U	U																				
Dibenzofuran	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dichlorobenzene, 1,2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dichlorobenzene, 1,3-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dichlorobenzene, 1,4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dichlorobenzidine, 3,3'-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dichlorophenol, 2,4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Diethyl phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dimethyl phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dimethylphenol, 2,4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Di-n-butyl phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dinitro-2-methylphenol, 4,6-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Dinitrophenol, 2,4-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Dinitrotoluene, 2,4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Dinitrotoluene, 2,6-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Di-n-octyl phthalate	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Fluoranthene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Fluorene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Hexachlorobenzene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Hexachlorobutadiene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Hexachlorocyclopentadiene	N	µg/L																10	10	10	U	R	10	10	10	U	R	10	10	10	U	R	10	10	10	U	R
Hexachloroethane	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Indeno(1,2,3-cd)pyrene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Isophorone	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Methylnaphthalene, 2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Methylphenol, 2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Methylphenol, 4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Naphthalene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Nitroaniline, 2-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Nitroaniline, 3-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Nitroaniline, 4-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Nitrobenzene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Nitrophenol, 2-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Nitrophenol, 4-	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
n-Nitroso-di-n-propylamine	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
n-Nitrosodiphenylamine	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Pentachlorophenol	N	µg/L																25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ	25	25	25	U	UJ
Phenanthrene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Phenol	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Pyrene	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Trichlorobenzene, 1,2,4-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Trichlorophenol, 2,4,5-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ
Trichlorophenol, 2,4,6-	N	µg/L																10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ	10	10	10	U	UJ

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
µg/L - micrograms per liter
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection lim
B - Analyte also found in blank.
R - Rejected.

APPENDIX B

ProUCL OUTPUT FOR UPPER CONFIDENCE LIMITS ON THE MEAN

Surface Soil ProUCL input - Ash Pit 3, PBOW

Sample No.	Units	Arsenic	D_Arsenic	Thallium	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
AP0032	mg/kg	7.7	1	1.45	0.156	0.168	0.268
AP0036	mg/kg	4.9	1	0.315	0.105	0.105	0.105
AP0039	mg/kg	12.4	1	3.25	0.215	0.215	0.215
AP0042	mg/kg	29	1	3	0.245	0.245	0.245
AP0045	mg/kg	13.7	1	2.6	0.215	0.215	0.215
AP0048	mg/kg	12.7	1	3	0.13	0.13	0.13
AP0051	mg/kg	7.7	1	0.46	0.155	0.155	0.155
AP0054/0056	mg/kg	44.05	1	0.725	0.2475	0.2475	0.2475

Surface Soil Output - Ash Pit 3, PBOW

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	AP 3 ss UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic - Surface Soil (AP 3)

General Statistics

Number of Valid Observations 8

Number of Distinct Observations 7

Raw Statistics

Minimum	4.9
Maximum	44.05
Mean	16.52
Median	12.55
SD	13.33
Coefficient of Variation	0.807
Skewness	1.586

Log-transformed Statistics

Minimum of Log Data	1.589
Maximum of Log Data	3.785
Mean of log Data	2.563
SD of log Data	0.721

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.798
Shapiro Wilk Critical Value	0.818

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	25.45

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	27.09
95% Modified-t UCL (Johnson-1978)	25.89

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	35.87
95% Chebyshev (MVUE) UCL	34.49
97.5% Chebyshev (MVUE) UCL	42.41
99% Chebyshev (MVUE) UCL	57.96

Gamma Distribution Test

k star (bias corrected)	1.471
Theta Star	11.23
MLE of Mean	16.52
MLE of Standard Deviation	13.62
nu star	23.53
Approximate Chi Square Value (.05)	13.49
Adjusted Level of Significance	0.0195
Adjusted Chi Square Value	11.61
Anderson-Darling Test Statistic	0.46
Anderson-Darling 5% Critical Value	0.723
Kolmogorov-Smirnov Test Statistic	0.267
Kolmogorov-Smirnov 5% Critical Value	0.297

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	28.81
95% Adjusted Gamma UCL	33.46

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	24.27
95% Jackknife UCL	25.45
95% Standard Bootstrap UCL	23.76
95% Bootstrap-t UCL	43.6
95% Hall's Bootstrap UCL	76.16
95% Percentile Bootstrap UCL	24.43
95% BCA Bootstrap UCL	26.7
95% Chebyshev(Mean, Sd) UCL	37.06
97.5% Chebyshev(Mean, Sd) UCL	45.95
99% Chebyshev(Mean, Sd) UCL	63.41

Potential UCL to Use

Use 95% Approximate Gamma UCL 28.81

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	AP 3 ss UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Thallium - Surface Soil (AP 3)

General Statistics

Number of Valid Observations	8	Number of Distinct Observations	7

Raw Statistics		Log-transformed Statistics	
Minimum	0.315	Minimum of Log Data	-1.155
Maximum	3.25	Maximum of Log Data	1.179
Mean	1.85	Mean of log Data	0.306
Median	2.025	SD of log Data	0.937
SD	1.247		
Coefficient of Variation	0.674		
Skewness	-0.156		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.85	Shapiro Wilk Test Statistic	0.85
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.685	95% H-UCL	6.712
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.86
95% Adjusted-CLT UCL (Chen-1995)	2.549	97.5% Chebyshev (MVUE) UCL	6.113
95% Modified-t UCL (Johnson-1978)	2.681	99% Chebyshev (MVUE) UCL	8.574

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.187	Data appear Normal at 5% Significance Level
Theta Star	1.558	
MLE of Mean	1.85	
MLE of Standard Deviation	1.698	
nu star	19	
Approximate Chi Square Value (.05)	10.12	Nonparametric Statistics
Adjusted Level of Significance	0.0195	95% CLT UCL 2.575
Adjusted Chi Square Value	8.527	95% Jackknife UCL 2.685
		95% Standard Bootstrap UCL 2.521
Anderson-Darling Test Statistic	0.592	95% Bootstrap-t UCL 2.64
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 2.378
Kolmogorov-Smirnov Test Statistic	0.266	95% Percentile Bootstrap UCL 2.533
Kolmogorov-Smirnov 5% Critical Value	0.298	95% BCA Bootstrap UCL 2.502
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 3.771
		97.5% Chebyshev(Mean, Sd) UCL 4.603
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 6.236
95% Approximate Gamma UCL	3.474	
95% Adjusted Gamma UCL	4.122	

Potential UCL to Use	Use 95% Student's-t UCL 2.685

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(a)anthracene - Surface Soil (AP 3)

General Statistics

Number of Valid Observations 8

Number of Distinct Observations 7

Raw Statistics

Minimum	0.105
Maximum	0.248
Mean	0.184
Median	0.186
SD	0.0541
Coefficient of Variation	0.294
Skewness	-0.154

Log-transformed Statistics

Minimum of Log Data	-2.254
Maximum of Log Data	-1.396
Mean of log Data	-1.737
SD of log Data	0.315

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.818

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.22

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.214
95% Modified-t UCL (Johnson-1978)	0.22

Assuming Lognormal Distribution

95% H-UCL	0.237
95% Chebyshev (MVUE) UCL	0.274
97.5% Chebyshev (MVUE) UCL	0.312
99% Chebyshev (MVUE) UCL	0.389

Gamma Distribution Test

k star (bias corrected)	7.722
Theta Star	0.0238
MLE of Mean	0.184
MLE of Standard Deviation	0.0661
nu star	123.6
Approximate Chi Square Value (.05)	98.89
Adjusted Level of Significance	0.0195
Adjusted Chi Square Value	93.31
Anderson-Darling Test Statistic	0.405
Anderson-Darling 5% Critical Value	0.715
Kolmogorov-Smirnov Test Statistic	0.246
Kolmogorov-Smirnov 5% Critical Value	0.294

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	0.215
95% Jackknife UCL	0.22
95% Standard Bootstrap UCL	0.212
95% Bootstrap-t UCL	0.218
95% Hall's Bootstrap UCL	0.208
95% Percentile Bootstrap UCL	0.213
95% BCA Bootstrap UCL	0.213
95% Chebyshev(Mean, Sd) UCL	0.267
97.5% Chebyshev(Mean, Sd) UCL	0.303
99% Chebyshev(Mean, Sd) UCL	0.374

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.229
95% Adjusted Gamma UCL	0.243

Potential UCL to Use

Use 95% Student's-t UCL 0.22

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene - Surface Soil (AP 3)

General Statistics

Number of Valid Observations 8

Number of Distinct Observations 7

Raw Statistics

Minimum	0.105
Maximum	0.248
Mean	0.185
Median	0.192
SD	0.0533
Coefficient of Variation	0.288
Skewness	-0.251

Log-transformed Statistics

Minimum of Log Data	-2.254
Maximum of Log Data	-1.396
Mean of log Data	-1.727
SD of log Data	0.312

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.925
Shapiro Wilk Critical Value	0.818

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.916
Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.221

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.214
95% Modified-t UCL (Johnson-1978)	0.221

Assuming Lognormal Distribution

95% H-UCL	0.238
95% Chebyshev (MVUE) UCL	0.275
97.5% Chebyshev (MVUE) UCL	0.314
99% Chebyshev (MVUE) UCL	0.39

Gamma Distribution Test

k star (bias corrected)	7.933
Theta Star	0.0233
MLE of Mean	0.185
MLE of Standard Deviation	0.0657
nu star	126.9
Approximate Chi Square Value (.05)	101.9
Adjusted Level of Significance	0.0195
Adjusted Chi Square Value	96.24
Anderson-Darling Test Statistic	0.346
Anderson-Darling 5% Critical Value	0.715
Kolmogorov-Smirnov Test Statistic	0.238
Kolmogorov-Smirnov 5% Critical Value	0.294

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.231
95% Adjusted Gamma UCL	0.244

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	0.216
95% Jackknife UCL	0.221
95% Standard Bootstrap UCL	0.214
95% Bootstrap-t UCL	0.219
95% Hall's Bootstrap UCL	0.209
95% Percentile Bootstrap UCL	0.213
95% BCA Bootstrap UCL	0.213
95% Chebyshev(Mean, Sd) UCL	0.267
97.5% Chebyshev(Mean, Sd) UCL	0.303
99% Chebyshev(Mean, Sd) UCL	0.373

Potential UCL to Use

Use 95% Student's-t UCL 0.221

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene - Surface Soil (AP 3)

General Statistics

Number of Valid Observations 8

Number of Distinct Observations 7

Raw Statistics

Minimum	0.105
Maximum	0.268
Mean	0.198
Median	0.215
SD	0.0601
Coefficient of Variation	0.304
Skewness	-0.516

Log-transformed Statistics

Minimum of Log Data	-2.254
Maximum of Log Data	-1.317
Mean of log Data	-1.669
SD of log Data	0.342

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.818

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.882
Shapiro Wilk Critical Value	0.818

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.238

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.228
95% Modified-t UCL (Johnson-1978)	0.237

Assuming Lognormal Distribution

95% H-UCL	0.263
95% Chebyshev (MVUE) UCL	0.303
97.5% Chebyshev (MVUE) UCL	0.349
99% Chebyshev (MVUE) UCL	0.438

Gamma Distribution Test

k star (bias corrected)	6.789
Theta Star	0.0291
MLE of Mean	0.198
MLE of Standard Deviation	0.0758
nu star	108.6
Approximate Chi Square Value (.05)	85.57
Adjusted Level of Significance	0.0195
Adjusted Chi Square Value	80.41

Anderson-Darling Test Statistic	0.485
Anderson-Darling 5% Critical Value	0.715
Kolmogorov-Smirnov Test Statistic	0.274
Kolmogorov-Smirnov 5% Critical Value	0.294

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.251
95% Adjusted Gamma UCL	0.267

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	0.232
95% Jackknife UCL	0.238
95% Standard Bootstrap UCL	0.23
95% Bootstrap-t UCL	0.234
95% Hall's Bootstrap UCL	0.225
95% Percentile Bootstrap UCL	0.23
95% BCA Bootstrap UCL	0.227
95% Chebyshev(Mean, Sd) UCL	0.29
97.5% Chebyshev(Mean, Sd) UCL	0.33
99% Chebyshev(Mean, Sd) UCL	0.409

Potential UCL to Use

Use 95% Student's-t UCL 0.238

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Total Soil ProUCL Input - Ash Pit 3, PBOW

Sample No.	Units	Arsenic	D_Arsenic	Thallium	D_Thallium	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
AP0032	mg/kg	7.7	1	2.9	0	0.156	0.168	0.268
AP0033	mg/kg	5	1	0.62	0	0.1	0.1	0.1
AP0036	mg/kg	4.9	1	0.63	0	0.105	0.105	0.105
AP0037	mg/kg	12.9	1	6.5	0	0.23	0.23	0.23
AP0039	mg/kg	12.4	1	6.5	0	0.215	0.215	0.215
AP0042	mg/kg	29	1	6	0	0.245	0.245	0.245
AP0043	mg/kg	8.5	1	0.58	0	0.1	0.1	0.1
AP0045	mg/kg	13.7	1	5.2	0	0.215	0.215	0.215
AP0046	mg/kg	20.3	1	2.5	0	0.105	0.105	0.105
AP0048	mg/kg	12.7	1	3	1	0.13	0.13	0.13
AP0049	mg/kg	16.7	1	2.9	1	0.17	0.17	0.17
AP0051	mg/kg	7.7	1	0.92	0	0.155	0.155	0.155
AP0052/0059	mg/kg	8.1	1	0.63	0	0.1075	0.1075	0.1075
AP0061A	mg/kg	30.6	1	0.61	0	0.105	0.105	0.105
AP0054/0056	mg/kg	44.05	1	1.45	0	0.2475	0.2475	0.2475
AP0055	mg/kg	32.7	1	0.5	1	0.105	0.105	0.105

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	AP3 ts UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic - Total Soil (AP 3)

General Statistics

Number of Valid Observations	16	Number of Distinct Observations	15

Raw Statistics

Minimum	4.9
Maximum	44.05
Mean	16.68
Median	12.8
SD	11.54
Coefficient of Variation	0.692
Skewness	1.146

Log-transformed Statistics

Minimum of Log Data	1.589
Maximum of Log Data	3.785
Mean of log Data	2.602
SD of log Data	0.672

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.861
Shapiro Wilk Critical Value	0.887

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.887

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	21.74

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	22.31
95% Modified-t UCL (Johnson-1978)	21.88

Assuming Lognormal Distribution

95% H-UCL	24.98
95% Chebyshev (MVUE) UCL	29.47
97.5% Chebyshev (MVUE) UCL	35.02
99% Chebyshev (MVUE) UCL	45.93

Gamma Distribution Test

k star (bias corrected)	2.08
Theta Star	8.021
MLE of Mean	16.68
MLE of Standard Deviation	11.57
nu star	66.56
Approximate Chi Square Value (.05)	48.79
Adjusted Level of Significance	0.0335
Adjusted Chi Square Value	47.06
Anderson-Darling Test Statistic	0.452
Anderson-Darling 5% Critical Value	0.747
Kolmogorov-Smirnov Test Statistic	0.16
Kolmogorov-Smirnov 5% Critical Value	0.217

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	21.43
95% Jackknife UCL	21.74
95% Standard Bootstrap UCL	21.29
95% Bootstrap-t UCL	23.06
95% Hall's Bootstrap UCL	22.21
95% Percentile Bootstrap UCL	21.67
95% BCA Bootstrap UCL	22.21
95% Chebyshev(Mean, Sd) UCL	29.26
97.5% Chebyshev(Mean, Sd) UCL	34.71
99% Chebyshev(Mean, Sd) UCL	45.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	22.76
95% Adjusted Gamma UCL	23.6

Potential UCL to Use

Use 95% Approximate Gamma UCL 22.76

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Thallium - Total Soil (AP 3)

General Statistics

Number of Valid Data	16	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	13
		Percent Non-Detects	81.25%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.5	Minimum Detected	-0.693
Maximum Detected	3	Maximum Detected	1.099
Mean of Detected	2.133	Mean of Detected	0.49
SD of Detected	1.415	SD of Detected	1.025
Minimum Non-Detect	0.58	Minimum Non-Detect	-0.545
Maximum Non-Detect	6.5	Maximum Non-Detect	1.872

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	16
Number treated as Detected	0
Single DL Non-Detect Percentage	100.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.78	Shapiro Wilk Test Statistic	0.764
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.495	Mean	-0.033
SD	1.256	SD	1.019
95% DL/2 (t) UCL	2.045	95% H-Stat (DL/2) UCL	3.339
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.384
		SD in Log Scale	0.621
		Mean in Original Scale	0.868
		SD in Original Scale	0.827
		95% t UCL	1.231
		95% Percentile Bootstrap UCL	1.233
		95% BCA Bootstrap UCL	1.327

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.908
5% K-S Critical Value	N/A	SD	0.913
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.323
		95% KM (t) UCL	1.474
Assuming Gamma Distribution		95% KM (z) UCL	1.439
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.395
Minimum	N/A	95% KM (bootstrap t) UCL	1.213
Maximum	N/A	95% KM (BCA) UCL	3
Mean	N/A	95% KM (Percentile Bootstrap) UCL	3
Median	N/A	95% KM (Chebyshev) UCL	2.316
SD	N/A	97.5% KM (Chebyshev) UCL	2.925
k star	N/A	99% KM (Chebyshev) UCL	4.121
Theta star	N/A		

Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	1.474
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	3
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options

From File	AP3 ts UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Benzo(a)anthracene - Total Soil (AP 3)

General Statistics

Number of Valid Observations	16	Number of Distinct Observations	11

Raw Statistics		Log-transformed Statistics	
Minimum	0.1	Minimum of Log Data	-2.303
Maximum	0.248	Maximum of Log Data	-1.396
Mean	0.156	Mean of log Data	-1.921
Median	0.143	SD of log Data	0.357
SD	0.0569		
Coefficient of Variation	0.366		
Skewness	0.546		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.83	Shapiro Wilk Test Statistic	0.84
Shapiro Wilk Critical Value	0.887	Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.181	95% H-UCL	0.186
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.217
95% Adjusted-CLT UCL (Chen-1995)	0.181	97.5% Chebyshev (MVUE) UCL	0.244
95% Modified-t UCL (Johnson-1978)	0.181	99% Chebyshev (MVUE) UCL	0.296

Gamma Distribution Test		Data Distribution
k star (bias corrected)	6.853	Data do not follow a Discernable Distribution (0.05)
Theta Star	0.0227	
MLE of Mean	0.156	
MLE of Standard Deviation	0.0595	
nu star	219.3	
Approximate Chi Square Value (.05)	186	**Nonparametric Statistics**
Adjusted Level of Significance	0.0335	95% CLT UCL 0.179
Adjusted Chi Square Value	182.5	95% Jackknife UCL 0.181
		95% Standard Bootstrap UCL 0.179
Anderson-Darling Test Statistic	1.074	95% Bootstrap-t UCL 0.182
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL 0.178
Kolmogorov-Smirnov Test Statistic	0.251	95% Percentile Bootstrap UCL 0.179
Kolmogorov-Smirnov 5% Critical Value	0.215	95% BCA Bootstrap UCL 0.181
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 0.218
		97.5% Chebyshev(Mean, Sd) UCL 0.245
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 0.297
95% Approximate Gamma UCL	0.184	
95% Adjusted Gamma UCL	0.187	
Potential UCL to Use		Use 95% Student's-t UCL 0.181
		or 95% Modified-t UCL 0.181

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(a)pyrene - Total Soil (AP 3)

General Statistics

Number of Valid Observations	16	Number of Distinct Observations	11

Raw Statistics

Minimum	0.1
Maximum	0.248
Mean	0.156
Median	0.143
SD	0.057
Coefficient of Variation	0.365
Skewness	0.499

Log-transformed Statistics

Minimum of Log Data	-2.303
Maximum of Log Data	-1.396
Mean of log Data	-1.916
SD of log Data	0.358

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.834
Shapiro Wilk Critical Value	0.887

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.84
Shapiro Wilk Critical Value	0.887

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.181

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.182
95% Modified-t UCL (Johnson-1978)	0.182

Assuming Lognormal Distribution

95% H-UCL	0.187
95% Chebyshev (MVUE) UCL	0.218
97.5% Chebyshev (MVUE) UCL	0.245
99% Chebyshev (MVUE) UCL	0.298

Gamma Distribution Test

k star (bias corrected)	6.833
Theta Star	0.0229
MLE of Mean	0.156
MLE of Standard Deviation	0.0598
nu star	218.7
Approximate Chi Square Value (.05)	185.4
Adjusted Level of Significance	0.0335
Adjusted Chi Square Value	182
Anderson-Darling Test Statistic	1.072
Anderson-Darling 5% Critical Value	0.74
Kolmogorov-Smirnov Test Statistic	0.254
Kolmogorov-Smirnov 5% Critical Value	0.215

Data not Gamma Distributed at 5% Significance Level

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.18
95% Jackknife UCL	0.181
95% Standard Bootstrap UCL	0.179
95% Bootstrap-t UCL	0.185
95% Hall's Bootstrap UCL	0.179
95% Percentile Bootstrap UCL	0.181
95% BCA Bootstrap UCL	0.18
95% Chebyshev(Mean, Sd) UCL	0.219
97.5% Chebyshev(Mean, Sd) UCL	0.245
99% Chebyshev(Mean, Sd) UCL	0.298

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.184
95% Adjusted Gamma UCL	0.188

Potential UCL to Use

Use 95% Student's-t UCL 0.181
or 95% Modified-t UCL 0.182

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Benzo(b)fluoranthene - Total Soil (AP 3)

General Statistics

Number of Valid Observations	16	Number of Distinct Observations	11

Raw Statistics

Minimum	0.1
Maximum	0.268
Mean	0.163
Median	0.143
SD	0.0635
Coefficient of Variation	0.39
Skewness	0.436

Log-transformed Statistics

Minimum of Log Data	-2.303
Maximum of Log Data	-1.317
Mean of log Data	-1.887
SD of log Data	0.388

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.831
Shapiro Wilk Critical Value	0.887

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.831
Shapiro Wilk Critical Value	0.887

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	0.191

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	0.191
95% Modified-t UCL (Johnson-1978)	0.191

Assuming Lognormal Distribution

95% H-UCL	0.198
95% Chebyshev (MVUE) UCL	0.233
97.5% Chebyshev (MVUE) UCL	0.263
99% Chebyshev (MVUE) UCL	0.322

Gamma Distribution Test

k star (bias corrected)	5.896
Theta Star	0.0276
MLE of Mean	0.163
MLE of Standard Deviation	0.067
nu star	188.7
Approximate Chi Square Value (.05)	157.9
Adjusted Level of Significance	0.0335
Adjusted Chi Square Value	154.7
Anderson-Darling Test Statistic	1.171
Anderson-Darling 5% Critical Value	0.74
Kolmogorov-Smirnov Test Statistic	0.257
Kolmogorov-Smirnov 5% Critical Value	0.216

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.194
95% Adjusted Gamma UCL	0.198

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	0.189
95% Jackknife UCL	0.191
95% Standard Bootstrap UCL	0.187
95% Bootstrap-t UCL	0.193
95% Hall's Bootstrap UCL	0.187
95% Percentile Bootstrap UCL	0.189
95% BCA Bootstrap UCL	0.19
95% Chebyshev(Mean, Sd) UCL	0.232
97.5% Chebyshev(Mean, Sd) UCL	0.262
99% Chebyshev(Mean, Sd) UCL	0.321

Potential UCL to Use

Use 95% Student's-t UCL	0.191
or 95% Modified-t UCL	0.191

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Groundwater ProUCL Input - Ash Pit 3, PBOW

Sample No.	Units	Arsenic	D_Arsenic	Cobalt	D_Cobalt	Iron	D_Iron	Manganese	D_Manganese
AP3083/084	ug/L	1	0	1.15	1	64.05	1	1770	1
AP3086	ug/L	1	0	1	0	23	0	52	1
AP3087	ug/L	1	0	1	0	23	0	151	1
AP3088	ug/L	9.9	1	1	0	2240	1	779	1
AP3091	ug/L	5.2	1	2.1	1	661	1	270	1
AP3092	ug/L	1	0	1.6	1	631	1	472	1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic - GW (AP3)

General Statistics

Number of Valid Data	6	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	4
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.2	Minimum Detected	1.649
Maximum Detected	9.9	Maximum Detected	2.293
Mean of Detected	7.55	Mean of Detected	1.971
SD of Detected	3.323	SD of Detected	0.455
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.85	Mean	0.195
SD	3.932	SD	1.391
95% DL/2 (t) UCL	6.085	95% H-Stat (DL/2) UCL	96.91
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)
Theta Star	N/A	
nu star	N/A	
A-D Test Statistic	N/A	**Nonparametric Statistics**
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method
K-S Test Statistic	N/A	Mean 5.983
5% K-S Critical Value	N/A	SD 1.752
Data not Gamma Distributed at 5% Significance Level		SE of Mean 1.011
		95% KM (t) UCL 8.021

Assuming Gamma Distribution			
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	7.647
Minimum	N/A	95% KM (jackknife) UCL	N/A
Maximum	N/A	95% KM (bootstrap t) UCL	N/A
Mean	N/A	95% KM (BCA) UCL	N/A
Median	N/A	95% KM (Percentile Bootstrap) UCL	N/A
SD	N/A	95% KM (Chebyshev) UCL	10.39
k star	N/A	97.5% KM (Chebyshev) UCL	12.3
Theta star	N/A	99% KM (Chebyshev) UCL	16.05
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	8.021
95% Gamma Approximate UCL (Use when n >= 40)	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Cobalt - GW (AP3)

General Statistics

Number of Valid Data	6	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	3
		Percent Non-Detects	50.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.15	Minimum Detected	0.14
Maximum Detected	2.1	Maximum Detected	0.742
Mean of Detected	1.617	Mean of Detected	0.451
SD of Detected	0.475	SD of Detected	0.302
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.999	Shapiro Wilk Test Statistic	0.997
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.058	Mean	-0.121
SD	0.681	SD	0.655
95% DL/2 (t) UCL	1.619	95% H-Stat (DL/2) UCL	2.675
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.027	Mean in Log Scale	-0.0608
SD	0.717	SD in Log Scale	0.621
95% MLE (t) UCL	1.617	Mean in Original Scale	1.099
95% MLE (Tiku) UCL	1.753	SD in Original Scale	0.651
		95% t UCL	1.634
		95% Percentile Bootstrap UCL	1.51
		95% BCA Bootstrap UCL	1.55
		95% H UCL	2.589

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level
Theta Star	N/A	
nu star	N/A	

A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	1.383
SD	0.36
SE of Mean	0.18
95% KM (t) UCL	1.746
95% KM (z) UCL	1.68
95% KM (jackknife) UCL	1.788
95% KM (bootstrap t) UCL	1.538
95% KM (BCA) UCL	2.1
95% KM (Percentile Bootstrap) UCL	2.1
95% KM (Chebyshev) UCL	2.168
97.5% KM (Chebyshev) UCL	2.508
99% KM (Chebyshev) UCL	3.175

Potential UCLs to Use

95% KM (t) UCL	1.746
95% KM (Percentile Bootstrap) UCL	2.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Iron - GW (AP3)

General Statistics

Number of Valid Data	6	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	2
		Percent Non-Detects	33.33%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	64.05	Minimum Detected	4.16
Maximum Detected	2240	Maximum Detected	7.714
Mean of Detected	899	Mean of Detected	6.204
SD of Detected	935.2	SD of Detected	1.484
Minimum Non-Detect	23	Minimum Non-Detect	3.135
Maximum Non-Detect	23	Maximum Non-Detect	3.135

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.858	Shapiro Wilk Test Statistic	0.909
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	603.2	Mean	4.95
SD	857.2	SD	2.257
95% DL/2 (t) UCL	1308	95% H-Stat (DL/2) UCL	11111369
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	362.1	Mean in Log Scale	4.904
SD	1061	SD in Log Scale	2.35
95% MLE (t) UCL	1235	Mean in Original Scale	603.3
95% MLE (Tiku) UCL	1300	SD in Original Scale	857.1
		95% t UCL	1308
		95% Percentile Bootstrap UCL	1177
		95% BCA Bootstrap UCL	1341
		95% H UCL	27167556

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.409
Theta Star	2198
nu star	3.272
A-D Test Statistic	0.318
5% A-D Critical Value	0.667
K-S Test Statistic	0.667
5% K-S Critical Value	0.403

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.000001
Maximum	2240
Mean	599.3
Median	347.5
SD	860.4
k star	0.169
Theta star	3544
Nu star	2.03
AppChi2	0.155
95% Gamma Approximate UCL (Use when n >= 40)	7863
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	620.7
SD	769.6
SE of Mean	362.8
95% KM (t) UCL	1352
95% KM (z) UCL	1217
95% KM (jackknife) UCL	1324
95% KM (bootstrap t) UCL	1638
95% KM (BCA) UCL	1714
95% KM (Percentile Bootstrap) UCL	1252
95% KM (Chebyshev) UCL	2202
97.5% KM (Chebyshev) UCL	2886
99% KM (Chebyshev) UCL	4230

Potential UCLs to Use

95% KM (t) UCL	1352
95% KM (Percentile Bootstrap) UCL	1252

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Manganese - GW (AP3)

General Statistics

Number of Valid Observations 6

Number of Distinct Observations 6

Raw Statistics

Minimum	52
Maximum	1770
Mean	582.3
Geometric Mean	333.7
Median	371
SD	636.6
Std. Error of Mean	259.9
Coefficient of Variation	1.093
Skewness	1.653

Log-transformed Statistics

Minimum of Log Data	3.951
Maximum of Log Data	7.479
Mean of log Data	5.81
SD of log Data	1.245

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.832
Shapiro Wilk Critical Value	0.788

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	1106

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1197
95% Modified-t UCL (Johnson-1978)	1135

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.995
Shapiro Wilk Critical Value	0.788

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	11557
95% Chebyshev (MVUE) UCL	1901
97.5% Chebyshev (MVUE) UCL	2462
99% Chebyshev (MVUE) UCL	3564

Gamma Distribution Test

k star (bias corrected)	0.627
Theta Star	928.2
MLE of Mean	582.3
MLE of Standard Deviation	735.2
nu star	7.529
Approximate Chi Square Value (.05)	2.465
Adjusted Level of Significance	0.0122
Adjusted Chi Square Value	1.55
Anderson-Darling Test Statistic	0.16
Anderson-Darling 5% Critical Value	0.715
Kolmogorov-Smirnov Test Statistic	0.135
Kolmogorov-Smirnov 5% Critical Value	0.341

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL (Use when n >= 40)	1778
95% Adjusted Gamma UCL (Use when n < 40)	2828

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	1010
95% Jackknife UCL	1106
95% Standard Bootstrap UCL	966.3
95% Bootstrap-t UCL	1736
95% Hall's Bootstrap UCL	2948
95% Percentile Bootstrap UCL	1007
95% BCA Bootstrap UCL	1102
95% Chebyshev(Mean, Sd) UCL	1715
97.5% Chebyshev(Mean, Sd) UCL	2205
99% Chebyshev(Mean, Sd) UCL	3168

Potential UCL to Use

Use 95% Student's-t UCL 1106

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX C

TOXICOLOGICAL PROFILES

Introduction to the Toxicological Profiles

1.0 Purpose and Use of the Toxicological Profiles

Human health toxicological profiles are presented for each chemical of potential concern (COPC), each chemical for which documentation of chemical-specific values is required or about which there are chemical-specific issues that require resolution. The toxicological profiles provide documentation of the chemical-specific physical properties and toxicity values used in the risk assessment (RA). They also discuss the identity, classification and uses of the chemical, the common sources of release to the environment and the fate of the chemical in the environment, including the relevance of aquatic and terrestrial food-chain pathways to human health. A brief review of toxicokinetics discusses absorption, distribution, metabolism or biotransformation, excretion of the parent compound and metabolites, and mechanism of toxicity including identifying the ultimate toxicant – i.e., the moiety (parent chemical or metabolite) identified as most likely responsible for the adverse effects associated with the chemical. This information may be helpful to determine whether laboratory animals may serve as appropriate models for toxicity to humans, and to clarify the nature of toxicological interactions with other chemicals. A discussion of dermal exposure provides perspective on the significance of dermal uptake, and documents the development of dermal toxicity values and the extent or rate of dermal uptake from soil or water according to U.S. Environmental Protection Agency (EPA) (2004) guidance.

The noncancer effects evaluation and carcinogenicity evaluation provide an overall perspective on the nature of the adverse effects associated with the chemical, as well as documentation of the toxicity values. Chemical-specific issues or controversies that may influence the interpretation or application of the results of the RA are also discussed herein. The toxicity values used in the RA are summarized in a table.

The overall purpose of the toxicological profiles is to provide perspective on characteristics of each of the chemicals included in the RA so that the numerical risk estimates can be interpreted and applied wisely in the management of the site.

2.0 Chemical Identity

The identity of the chemical or chemical class is given in the title of each profile; additional information or clarification is provided in the *Introduction and Physical Properties* Section as required. The hyphenated number in parentheses following the chemical name is its unique Chemical Abstract Service (CAS) registration number. The CAS number may be located in the profile title, text, or in the case of multiple isomers or members of a chemical class, in the table that provides the physical properties.

3.0 Physical Properties

The toxicological profiles also provide documentation for the physical properties or constants that are important for chemical transport modeling, such as molecular weight (MW) in grams per mole (g/mole), the log of the octanol/water partition coefficient (log K_{ow}), Henry's Law constant (H) in atmosphere-cubic meters per mole (atm-m^3/mole), the soil/water partition coefficient (K_d) in liters per kilogram (L/kg) for metals, the log of the soil/organic carbon partition coefficient (log K_{oc}) (unitless) for organic chemicals, diffusivity in air (D_a) in square centimeters per second

(cm^2/s), diffusivity in water (D_w) in cm^2/s, vapor pressure (VP) in atmospheres (atm), solubility in water (S) in milligrams per liter (mg/L), and, for volatile organic compounds (VOC), boiling point of pure compound (T_b) in degrees Kelvin (°K), critical temperature (T_c) in °K, and enthalpy of vaporization at the boiling point ($\Delta H_{v,b}$) in calories per mole (cal/mol). Organic chemicals are designated as VOCs or semivolatile organic compounds (SVOC) based on their propensity to volatilize from environmental media. Chemicals designated as VOCs generally have an H greater than 1E-5 atm-m^3/mole (EPA, 2002).

The physical constants generally are taken from the most reliable source (i.e., the source that provides the highest level of documentation). Values for interrelated properties are usually taken from the same source (e.g., H is often estimated from VP and S; therefore, the same source is generally used for all three property values). When one source provides several values for a given property, professional judgment is used to select the most appropriate. Obvious outliers may be dropped from consideration. The average or the midpoint of a range of values may be selected. K_d values for metals and K_{oc} values for ionizing organic compound are based on a default pH of 6.8 (EPA, 2002) if the data are available. VP, S and H values are limited to those provided for normal ambient temperatures (0 to 30 °C) and the reference temperature is provided.

When values for H are not located, they are calculated as follows, provided the requisite information is available (EPA, 1998):

$$H = \frac{VP \bullet MW}{S}$$

where:

H	=	Henry's law constant (atm-m^3/mole, calculated)
VP	=	vapor pressure (atm)
MW	=	molecular weight (g/mole)
S	=	solubility in water (mg/L).

When values for K_{oc} are not located, they are calculated as follows for phthalates and polyaromatic aromatic hydrocarbons (PAH) provided log K_{ow} is available (EPA, 1998):

$$\log K_{oc} = 0.97 \log K_{ow} - 0.094$$

where:

K_{oc}	=	soil/organic carbon partition coefficient (unitless, calculated)
K_{ow}	=	octanol/water partition coefficient (unitless).

K_{oc} for other organic chemicals is calculated as follows provided log K_{ow} is available (EPA, 1998):

$$\log K_{oc} = 0.78 \log K_{ow} + 0.151$$

where:

K_{oc} = soil/organic carbon partition coefficient (unitless, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

When values for D_a are not located, they are calculated as follows (EPA, 1998):

$$D_a = \frac{1.9}{MW^{2/3}}$$

where:

D_a = diffusivity in air (cm^2/s, calculated)
MW = molecular weight (g/mole).

When values for D_w are not located, they are calculated as follows (EPA, 1998):

$$D_w = \frac{22E{-}5}{MW^{2/3}}$$

where:

D_w = diffusivity in water (cm^2/s, calculated)
MW = molecular weight (g/mole).

Values for T_b, T_c and $\Delta H_{v,b}$ for VOCs are preferentially taken from EPA (2004), unless there is evidence that values provided by other sources (HSDB, 2013; NIST, 2013) are more reliable. If values are not located for these variables, they may be estimated by the most appropriate technique for the specific chemical or class to which it belongs as recommended by Lyman et al. (1990). The estimation method used is identified by footnote in the table of physical properties.

4.0 Environmental Release, Fate and Transport

The toxicological profiles also present the predominant sources of release to the environment as well as a qualitative or semi-quantitative description of the fate and transport of the chemical in air, water, sediment, and soil. No attempt is made to present detailed quantitative data because environmental fate is usually highly dependent on climatic conditions and the characteristics of the medium of interest, both of which may differ from location to location and change from time to time. The source and fate information may provide perspective regarding the likelihood that the chemical's presence is related to site activities, that the chemical will migrate across media, or that the chemical will persist at toxicologically significant levels.

Biotransfer factors are provided for chemicals for which food-chain pathways may be significant, which includes a few inorganic chemicals and those organic chemicals that are highly lipophilic, persist in the environment, and are resistant to metabolism by lower trophic organisms in the food chain. High lipophilicity is indicated by a log K_{ow} greater than 3 (Lyman et al., 1990). Lipophilicity enhances partitioning to biomedia and passage across biological

membranes. Persistence in the environment is evidence that the chemical might resist biotransformation and, therefore, remain in edible tissues at toxicologically significant concentrations. Toxicokinetic data, when available, clarify the potential for biotransfer. Biotransformation products may be more toxic than the parent compound, but they tend to be short-lived or more quickly removed from the body, reducing the likelihood of significant bioaccumulation. Similarly, VOCs tend to be mobile and labile (i.e., subject to rapid and extensive biotransformation and excretion), and generally do not participate significantly in food-chain pathways. Therefore, biotransfer factors are not estimated for VOCs, with few exceptions. Some SVOCs, however, are highly lipophilic and may persist. Biotransfer factors generally are not estimated unless empirical data suggest that participation in food-chain pathways is likely to be significant.

The biotransfer factors of interest are water-to-fish bioconcentration factors (BCF) or bioaccumulation factors (BAF), or biota-sediment accumulation factors (BSAF), soil-to-plant biotransfer factors (Bp), cattle ingestion-to-beef factors (Bb) and cattle ingestion-to-milk factors (Bm). Separate soil-to-plant biotransfer factors are available for the reproductive parts of plants (e.g., fruits, seeds) and the vegetative parts of plants (e.g., stems, leaves) for inorganic and some organic chemicals. Soil-to-plant factors for the reproductive parts of plants are designated Bpr; soil-to-plant factors for the vegetative parts of plants are designated Bpv.

Most chemicals in surface water bodies remain predominantly in the dissolved phase in the water column or partition to sediment, which generally settles to the bottom. The difference in concentration between surface water and sediment is usually upwards of an order of magnitude. Theoretically, it is appropriate to evaluate biotransfer from both media, using BCF to quantify uptake from water and BSAF to quantify uptake from sediment. Quantification of biotransfer, however, is accompanied by considerable uncertainty and variability because field conditions cannot be readily duplicated in the laboratory where BCF values are generally measured. Therefore, the biotransfer models for either medium are intentionally designed to be very conservative to ensure protection of human health. Consequently, evaluating biotransfer from both water and sediment captures the conservatism of both models and is likely to grossly overestimate total biotransfer. Therefore, most chemicals with the potential to participate significantly in aquatic food chain pathways are evaluated for bioconcentration from surface water *or* bioaccumulation from sediment, depending on which pathway is expected to predominate, but not both.

BCF values are adopted from empirical data when the data are clearly the best choice (i.e., similar results in multiple species of fin fish). When the empirical data are few or inconsistent, BCFs for inorganic chemicals are taken from various sources. BCF values for organic chemicals are generally estimated from the Bintein and Devillers model (Devillers et al., 1996):

$$\log BCF = 0.910 \log K_{ow} - 1.975 \log(6.8E{-}7 K_{ow} + 1) - 0.786$$

where:

BCF = bioconcentration factor (L/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

The Bintein and Devillers model is selected over simpler models adopted by the EPA largely because the Bintein and Devillers approach has undergone scrutiny since first published (Bintein and Devillers, 1993), and considerable effort was expended to validate the model; i.e., to compare modeled and empirical results. The Bintein and Devillers model is probably more realistic than simpler models, particularly for chemicals with higher log K_{ow} values. BSAF values are chosen instead of BCFs for those very highly lipophilic chemicals such as the polychlorinated biphenyls (PCB), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and selected organochlorine pesticides expected to partition almost entirely to benthic sediment.

Soil-to-plant biotransfer factors (Bp) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bp = 1.588 - 0.578 \log K_{ow}$$

where:

Bp = soil-to-plant biotransfer factor (unitless, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

Separate biotransfer factors are not estimated for the reproductive parts of plants (Bpr) and the vegetative parts of plants (Bpv) by the Travis and Arms model.

Cattle ingestion-to-beef factors (Bb) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bb = -7.6 + \log K_{ow}$$

where:

Bb = cattle ingestion-to-beef biotransfer factor (days/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

Cattle ingestion-to-milk factors (Bm) for SVOCs are estimated by a simple model by Travis and Arms (1988), which is based only on log K_{ow}:

$$\log Bm = -8.10 + \log K_{ow}$$

where:

Bm = cattle ingestion-to-milk biotransfer factor (days/kg, calculated)
K_{ow} = octanol/water partition coefficient (unitless).

It should be understood that the biotransfer models described above depend only on one or two physical property values that are related largely to the propensity for transfer across biological membranes. Many compounds have relatively large log K_{ow} values, indicating ready passage across membranes; however, they are sufficiently volatile, or are otherwise mobile or labile so

they are unable to persist in biological tissues. For example, many constituents with high log K_{ow} values are efficiently metabolized by lower trophic organisms in the food chain so that significant human exposure does not occur. Such is the case for practically all VOCs and most SVOCs; relatively few compounds participate significantly in food-chain pathways. Therefore, biotransfer is evaluated as a potential pathway only for those chemicals with empirical data that indicate food-chain exposure could be significant.

5.0 Toxicokinetics

Toxicokinetics describes the uptake or absorption of the chemical from contact media, the distribution of the chemical (or its metabolites) within the body following absorption, the metabolism or biotransformation of the chemical, and the mechanisms of excretion of the parent compound and its biotransformation products from the body. The toxicokinetics section documents the gastrointestinal (GI) absorption factor (GAF) required to develop toxicity factors for dermal exposure, because dermal risk characterization depends on an absorbed dose rather than an exposure dose. The toxicokinetics section also identifies the compounds that are rapidly metabolized or eliminated, which justifies excluding their evaluation in food-chain pathways even though they may have a large K_{ow} that indicates ready passage across cell membranes. This section also tries to identify the ultimate toxicant and elucidate the most important mechanism(s) of toxicity.

6.0 Dermal Exposure

The toxicological profiles provide the documentation for the GAF, which is used to develop the dermal toxicity values. The toxicological profiles also provide documentation for the dermal absorption factor (ABS), which describes the extent of dermal uptake from soil, and the time for dermal uptake to reach steady state (t*), the permeability coefficient (K_p), the lag time for chemical to cross the stratum corneum (τ), the fraction absorbed (FA), and the ratio of the permeability coefficient for passage across the stratum corneum to the permeability coefficient for passage across the viable epidermis (B), all which are used to estimate the rate of dermal uptake from water. These values are taken from listings in EPA (2004) if available. Otherwise, they are estimated by the EPA (2004) methods.

7.0 Toxicity Evaluation

The toxicological profile contains a brief description of the nature of the adverse effects associated with the chemical. It is important to note that a discussion of adverse effects without a discussion of dose is incomplete and potentially misleading, because virtually any chemical may be toxic at some dose, and many chemicals (e.g., nutritionally required minerals, vitamins, amino acids, etc.) enhance human health at some low dose. An ever growing and compelling body of evidence suggests that many environmental contaminants also enhance health at low doses (Hart and Frame, 1996).

7.1 Noncancer Evaluation

The toxicity values for noncancer effects include a reference dose (RfD) expressed in milligrams per kilogram per day (mg/kg-day) for chronic or subchronic oral exposure, and a reference concentration (RfC), in milligrams per cubic meter (mg/m^3), for chronic or subchronic inhalation exposure. The inhalation RfC in units of mg/m^3 may be converted to an equivalent inhalation RfD by assuming continuous chronic exposure of humans with a body weight of 70 kg and an

inhalation rate of 20 m^3/day (EPA, 1989, 1991). In other words, the RfC expressed as mg/m^3 is multiplied by the inhalation rate of 20 m^3/day, and the result is divided by the assumed adult body weight of 70 kg to yield an inhalation RfD expressed as mg/kg-day.

RfD and RfC values are usually derived from empirical benchmark doses (BMD) or concentrations called no-observed-effect levels (NOEL) or no-observed-adverse-effect levels (NOAEL) from animal toxicity or human epidemiology studies. If the data do not permit identifying a NOEL or NOAEL, a lowest-observed-adverse-effect level (LOAEL) or lowest-effect level (LEL) may be used. A frank-effect level (FEL), e.g., mortality, shortened life span or serious physiologic, neurologic or behavioral disturbances, is generally considered an inappropriate benchmark from which to develop an RfD or RfC. Some RfD and RfC derivations employ a BMD that is a statistically estimated dose for humans at which some low proportion of the population may experience some minimally adverse effect. A BMD at which 10 percent of the population may be expected to experience such an effect is expressed as BMD_{10}. The RfD or RfC is derived by dividing the benchmark level (e.g., NOAEL or BMD_{10}) by a series of uncertainty and modifying factors, which collectively are designated the uncertainty factor (UF).

RfD and RfC values are not currently available for acute toxicity and acute exposure is not evaluated in the RA. Nonetheless, the levels associated with acute lethality and data regarding the effects of acute exposure to levels higher than ordinarily observed in chronic environmental exposure provide additional perspective regarding the toxicity of the chemical. Therefore, information regarding acute toxicity, when available, is included in the profiles. Lethality data for laboratory animals are generally expressed as the oral dose associated with lethality of 50 percent of an exposed population (LD_{50}) or the concentration in air associated with lethality of 50 percent of an exposed population (LC_{50}). Occasionally the dose associated with lethality in a low percentage of an exposed population (LD_{LO}) is presented.

RfD and RfC values are derived for both chronic and subchronic exposure. For purposes of the RA, chronic exposure is defined as equal to or greater than 7 years, i.e., at least 10 percent of expected life span; subchronic exposure is defined as 2 weeks to 7 years.

Under the assumption of monotonicity (i.e., incidence, intensity, or severity of effects can increase, but cannot decrease, with increasing magnitude or duration of exposure), a chronic RfD may be considered sufficiently protective for subchronic exposure, but a subchronic RfD may not be protective for chronic exposure. Currently, verified subchronic RfD values are unavailable. Provisional subchronic RfDs exist for few chemicals and are compiled in the Health Effects Assessment Summary Tables (HEAST) (EPA, 1997) and some National Center for Environmental Assessment (NCEA) or Provisional Peer Reviewed Toxicity Value (PPRTV) derivations. Although once updated semi-annually, the HEAST is no longer updated, because the EPA (2005) Integrated Risk Information System (IRIS) is generally considered the source of the highest quality toxicity values. For some chemicals the PPRTV derivations are more recent and it is known that summaries on IRIS will be replaced with the PPRTV derivations. In these cases the PPRTV values will be selected preferentially to those on IRIS. Subchronic RfD and RfC values are generally obtained from EPA (1997) or more recent NCEA or PPRTV evaluations, or they may be derived *de novo* from the toxicological data set or from chronic RfD values as follows:

- If the UF applied in the derivation of the chronic RfD does not provide for expansion from subchronic to chronic exposure (e.g., if the chronic RfD was derived from a chronic study), the chronic RfD is adopted as being sufficiently protective for subchronic exposure.

- If the UF applied in the derivation of the chronic RfD contains a component to expand from subchronic to chronic exposure, the subchronic RfD is derived by multiplying the chronic RfD by the component of the UF used to expand from subchronic to chronic exposure (e.g., if a factor of 10 was used to expand from subchronic to chronic exposure, the subchronic RfD will be 10 times larger than the chronic RfD).

7.2 Carcinogenicity Evaluation

The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect (EPA, 1986, 2005). EPA (2005) recognizes five weight-of-evidence group classifications for carcinogenicity. Formerly, EPA (1986) used a letter-based system to describe the weight of evidence for carcinogenicity. Reference to this former system is included because many of the carcinogenicity assessments listed on the Integrated Risk Information System (IRIS) use the former letter-based system (EPA, 2013). The five EPA weight-of-evidence classifications are as follows:

- ***Carcinogenic to Humans*** (corresponds to the former Group A - Human Carcinogen).

- ***Likely to be Carcinogenic to Humans*** (includes both the former Group B1 and Group B2-Probable Human Carcinogens)

- ***Suggestive Evidence of Carcinogenic Potential*** (corresponds to the former Group C - Possible Human Carcinogen)

- ***Inadequate Information to Assess Carcinogenic Potential*** (corresponds to the former Group D - Not Classifiable as to Human Carcinogenicity)

- ***Not Likely to be Carcinogenic to Humans*** (corresponds to the former Group E - Evidence of Noncarcinogenicity to Humans).

Toxicity values for cancer risk include a slope factor (SF) for oral exposure, expressed as the risk per mg/kg-day ingested dose, and a unit risk factor (URF) for inhalation exposure, expressed as the risk per microgram per cubic meter ($\mu g/m^3$) in ambient air. These quantitative estimates are generally provided for chemicals in EPA weight-of-evidence Groups A, B and C if the data are adequate. The SF or URF is usually estimated as an upper bound on the slope of the dose- or concentration-response curve from animal toxicity or human epidemiology studies. The inhalation URF in units of risk per $\mu g/m^3$ may be converted to an equivalent inhalation SF in units of risk per mg/kg-day by assuming continuous lifetime exposure of humans with a body weight to 70 kg and an inhalation rate of 20 m^3/day. In other words, the URF expressed as risk per $\mu g/m^3$ is divided by the inhalation rate of 20 m^3/day, and multiplied by the assumed body weight of 70 kg and a conversion factor of 1000 μg/mg.

EPA (1986, 2005) generally assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk. A few potential carcinogens are understood to require a threshold for carcinogenic expression. Such chemicals are more appropriately evaluated with an RfD developed as described above.

7.3 Hierarchy for Selecting Toxicity Data

Toxicity values generally are chosen using the following hierarchy:

- The EPA's (2013) on-line IRIS database containing toxicity values that have undergone the most rigorous Agency review.
- PPRTV derivations for the Superfund Technical Support Center (STSC); there may be individual chemicals for which the PPRTV derivations supercede those on IRIS.
- Older NCEA derivations for the STSC, HEAST (EPA, 1997), or other EPA documents or memoranda.

When EPA-derived toxicity values are not located in any of the above sources, Minimal Risk Levels (MRL) from the Agency for Toxic Substances Disease Registry (ATSDR) toxicological profiles may be adopted or adapted for use in the RA. MRLs are derived by a methodology similar to the EPA methodology for RfD derivation. ATSDR toxicological profiles generally identify levels significant to human health with particular emphasis on target organ and mechanism of toxicity. Also, the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) has derived toxicity values for certain chemicals (and their degradation products) associated with military use. Finally, the primary literature may be surveyed to determine whether sufficient data exist to derive a toxicity value using the EPA methodology. The use of surrogate chemicals is also considered if the chemical structure, adverse effects, and toxic potency of the surrogate and chemical of interest are judged to be sufficiently similar.

GAFs, used to derive dermal RfD values and SFs from the corresponding oral toxicity values, are obtained from the following hierarchy:

- EPA (2004)
- Empirical data
- PPRTV summaries or NCEA position papers
- Federal agency reviews of the empirical data, such as ATSDR toxicological profiles and various EPA criteria documents
- Other published reviews of the empirical data.

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METALS

ARSENIC (7440-38-2)

1.0 Introduction and Physical Properties

Arsenic is a natural **metalloid**, the 20th most abundant element in the earth's crust that occurs in both inorganic and organic forms (ATSDR, 2007; HSDB, 2013). Elemental arsenic is a steel-grey material that may occur naturally. However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Most inorganic and organic arsenic compounds are non-volatile, odorless and tasteless white or colorless powders. Inorganic arsenic occurs naturally in soil and in many kinds of rock, especially in minerals and ores that contain copper or lead. Inorganic arsenic is more toxic than organic forms. Major uses of arsenic in the U.S. include its incorporation into wood preservatives and other agricultural chemicals. It is also used as a metal in various electrical devices and is alloyed with lead and copper in the manufacture of lead bullets or shot (Lewis, 1997). Arsenic is also a component of the chemical warfare agent Lewisite (Opresko et al., 1998). Lewisite is manufactured by the condensation of arsenic trichloride with acetylene in the presence of aluminum, copper or mercuric chloride (Lewis, 1997). Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
74.92[a]	NA	NA	2.9E+1[b]	NA	NA	Note 1[c]	Note 2[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Variable: inorganic arsenic compounds are not likely to volatilize; some organic arsenic compounds are low-boiling liquids or gases at normal temperatures.
Note 2: Variable: inorganic arsenic compounds range from practically insoluble to freely miscible in water; most organic arsenic compounds are not readily soluble, most arsenic acid compounds are soluble to freely miscible.
[a] Hazardous Substance Data Bank (HSDB), 2013, National Library of Medicine, on line.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***,, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.
[c]Agency for Toxic Substances and Disease Registry, (ATSDR), 2007, ***Toxicological Profile for Arsenic***, U.S. Public Health Service, Atlanta, Georgia, August.

2.0 Environmental Fate and Transport

The production of arsenic and its use in nonferrous alloys and in the manufacture of semiconductors may result in its release to the environment through various waste streams HSDB, 2013). Other important anthropogenic releases are metal smelting, coal burning, and other industrial activities. Arsenic may be present at military sites as a result of training with or demilitarization or disposal of Lewisite. Most (approximately 80 percent) of anthropogenic releases are initially to soil (ATSDR, 2007).

Arsenic occurs in the air as a combination of trivalent and pentavalent forms almost entirely adsorbed to small particles that permit dispersion over long distances (ATSDR, 2007). Residence time in the atmosphere averages approximately nine days. Removal is largely by wet and dry deposition. Arsenic in surface water can undergo a variety of reactions and exist as several different soluble compounds. Sorption to sediment is often an important removal process, but biotransformation in sediment may return soluble forms to the water. Arsenic in soil generally exists as insoluble forms sorbed to clay or organic matter or complexed with calcium or iron.

Mobility is low and leaching is not generally significant, except that increasing soil pH can dramatically increase solubility and mobility.

Arsenic has been shown to bioconcentrate in aquatic organisms, mainly at the water-algae interface (ATSDR, 2007). There is no evidence for biomagnification through the various trophic levels, nor do there appear to be significant differences between bottom-feeders and predatory fish. Arsenic is among the metals listed as being of no concern for bioaccumulation in fish (EPA, 1995). Empirical data suggest that bioconcentration through terrestrial food chain pathways is unlikely to be significant (ATSDR, 2007). Therefore, biotransfer factors are not developed for arsenic.

3.0 Toxicokinetics

All forms of inorganic arsenic are readily absorbed by the lungs and GI tract; the extent of absorption is greater for more soluble compounds than for more insoluble compounds (ATSDR, 2007). Dermal absorption has not been well characterized but is significantly less than inhalation or oral absorption. GI and dermal absorption of arsenic from soil is much lower than from aqueous solution. Distribution is generally widespread throughout the body following absorption.

Metabolism of inorganic arsenic involves reduction of As^{+5} to As^{+3}, and oxidation of As^{+3} to As^{+5} so that arsenic is present systemically as a mixture of arsenate and arsenite (ATSDR, 2007). Arsenite is readily oxidized and methylated primarily in the liver to form the organic compounds monomethyl arsonic acid and dimethyl arsinic acid, which are rapidly excreted in the urine.

4.0 Dermal Exposure

EPA (2004) concluded that a GAF should not be estimated for the purpose of adjusting oral toxicity values for dermal exposure. Therefore, the oral toxicity values described below are used directly without adjustment for evaluating dermal exposure.

EPA (2004) cites empirical data indicating that dermal uptake of arsenic from soil approximates 3 percent. The ABS of 0.03 recommended by EPA (2004) is used herein. Empirical data regarding the uptake of soluble forms of arsenic from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for arsenic.

5.0 Noncancer Effects Evaluation

Inorganic arsenic may be an essential nutrient, at least for food-producing domestic animals, exerting beneficial effects on growth, health and feed conversion efficiency (Underwood, 1977). A lethal dose of arsenic trioxide in humans is 70-180 mg, approximately 50 to 140 mg arsenic (Ishinishi et al., 1986). Acute oral exposure of humans to high doses of arsenic produces liver swelling, skin lesions, disturbed heart function and neurological effects. The only noncancer effects in humans clearly attributable to chronic oral exposure to arsenic are dermal hyper pigmentation and keratosis, as revealed by studies of several hundred Chinese exposed to naturally occurring arsenic in well water (EPA, 2013). Similar effects were observed in persons exposed to high levels of arsenic in water in Utah and the northern part of Mexico. EPA (2013) verified an RfD of 3E-4 mg/kg-day for chronic oral exposure, based on a NOAEL of 8E-4 mg/kg-day for hyper pigmentation and kertatosis of the skin from the Chinese data. An uncertainty factor of 3 was applied. An increased incidence of Blackfoot disease was also observed, which may not be related to arsenic alone. Goyer (1991) describes black-foot disease

as a peripheral vascular disorder manifested as acrocyanosis and Raynaud's disease, which may progress to gangrene. EPA (2013) notes that the skin is the more sensitive target organ. Nonetheless, in keeping with EPA (1989) guidance regarding selection of target organ, both the skin and peripheral vascular system are selected as target organs for prolonged oral exposure to arsenic. Confidence in the RfD is medium.

The available data do not suggest a significant difference between chronic and subchronic exposure regarding the threshold for noncancer effects. Therefore, EPA (1997) adopted the chronic oral RfD as the provisional subchronic oral RfD for arsenic.

Occupational (predominantly inhalation) exposure is also associated with neurological deficits, anemia, and vascular effects (Ishinishi et al., 1986). However, concomitant exposure to other chemicals cannot be ruled out in the occupational studies. Therefore, the data are not sufficient for estimation of an inhalation RfC.

6.0 Carcinogenicity Evaluation

Inorganic arsenic is clearly a carcinogen in humans. Inhalation exposure is associated with increased risk of lung cancer in persons employed as smelter workers, in arsenical pesticide applicators, and in a population residing near a pesticide manufacturing plant (EPA, 2013). Oral exposure to high levels in well water is associated with increased risk of skin cancer and several forms of internal cancer, although the role of other chemicals in the internal cancers is unclear. Extensive animal testing with various forms of arsenic given by many routes of exposure to several species, however, has not demonstrated the carcinogenicity of arsenic, indicating that the common laboratory animals are not good models for carcinogenicity to humans. EPA (2013) classified inorganic arsenic in cancer weight-of-evidence Group A (human carcinogen), and recommended an oral SF of 1.5E+0 per mg/kg-day, based on the incidence of skin cancer in the Chinese study. EPA (2007) noted that arsenic probably functions via several different mechanisms of toxicity not including direct interaction with DNA. These appear to obey thresholds or to generate a non-linear slope that approaches 0 in the low-dose range. The SF probably exaggerates cancer risk in the low dose range associated with most environmental exposures, although the extent is unclear.

An inhalation URF of 4.3E-3 per $\mu g/m^3$, equivalent to an inhalation SF of 1.5E+1 per mg/kg-day, was derived for inorganic arsenic from the incidence of lung cancer in occupationally exposed men (EPA, 2013).

7.0 Toxicity Summary

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
3E-4	3E-4	S, PVS	ND	ND	NA	A	1.5E+0	A	4.3E-3	1.5E+1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Target organ or critical effect abbreviations: S = skin; PVS = peripheral vascular system. [a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.										

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CHROMIUM (7440-47-3)

1.0 Introduction and Physical Properties

Chromium is a naturally occurring **metal** (ATSDR, 2012). It occurs in several valence states; chromium (III) (16065-83-1) and chromium (VI) (18540-29-9) are the forms most commonly encountered in environmental media. Chromium is used largely in the metallurgical, refractory and chemical industries. The largest amount is used in the metallurgical industry in various steels and nonferrous alloys. The second largest use is by the chemical industry in pigments, metal finishing, leather tanning and wood treatment. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
52.00[a] (element)	NA	NA	1.8E+6 (CrIII) 1.9E+1 (CrVI)[b]	NA	NA	ND	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Chromium compounds vary from insoluble to highly soluble.
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 2012, ***Toxicological Profile for Chromium***, U.S. Public Health Service, Atlanta, Georgia, on line.
U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

2.0 Environmental Fate and Transport

Chromium is released into the atmosphere from natural gas, oil and coal combustion, and from use by the industries mentioned above (ATSDR, 2012). Other sources include wind transport from road dust, cement producing plants, the wearing down of asbestos brake linings from automobiles, incineration of municipal refuse and sewage sludge, exhaust emission from automotive catalytic converters, and emissions from cooling towers that use chromium compounds as rust inhibitors. Significant quantities of chromium are released to surface water from industrial use. Land disposal of chromium-containing commercial products, solid waste and slag from chromate manufacture, and coal ash, primarily from electric utilities and other operations that burn coal, are the major releases to soil.

Chromium releases from combustion processes and ore processing are generally in the form of chromium (III) oxide; however, chromium (VI) has been identified in fly ash from coal combustion at chromate manufacturing and user sites (ATSDR, 2012). Airborne chromium exists in particulate form that may travel great distances from the point of emissions; wet and dry deposition account for the majority of removal from air.

Most chromium released to surface water eventually adsorbs to particles and becomes deposited in bottom sediment, but small quantities may remain in the water in both soluble and insoluble forms (ATSDR, 2012). The soluble forms are usually chromium (VI) salts and soluble chromium (III) compounds. Chromium (VI) may be found in water, but eventually organic matter and other reducing agents will reduce chromium (VI) to chromium (III). Chromium in soil is present mainly as insoluble chromium (III) carbonates and oxides that are unlikely to be mobile to any

significant extent. However, soluble forms may also be present, depending on the form of the chemical released, that may be quite mobile in soil. Also, lower pH facilitates complexation with organic matter and increases mobility.

Empirical evidence suggests that chromium is unlikely to participate significantly in food chain pathways (ATSDR, 2012; EPA, 1995); therefore, biotransfer factors are not compiled.

3.0 Toxicokinetics

Identification of chromium in urine, serum and tissues of occupationally exposed humans confirms that soluble chromium (III) and chromium (VI) compounds are absorbed from the lung (ATSDR, 2012). The rate of absorption, however, depends largely on the physical and chemical characteristics of the chromium compound involved, as shown in numerous animal inhalation studies. Chromium (VI) compounds are more readily absorbed because the chromate anion participates in facilitated diffusion mechanisms not available to chromium (III).

Absorption of dietary sources of chromium from the GI tract in humans ranges from approximately 0.5 to 2 percent, as inferred from urinary excretion data (ATSDR, 2012). The extent of absorption appears to be inversely related to dietary chromium content. A review of several studies suggests that 0.4 to 14.5 percent of orally administered chromium not related to dietary sources is absorbed by the GI tract of humans, but valence and chemical form and nutritional status (fed vs. fasting) appear to influence efficiency of absorption (ATSDR, 2012). Chromium (VI) sources are more efficiently absorbed than chromium (III) sources as described above for inhalation exposure. Experiments with laboratory animals showed that the stomach has the ability to reduce chromium (VI) to chromium (III), reducing the extent of absorption when chromium (VI) compounds were administered *per os* compared with injection directly into the jejunum.

Both chromium (III) and chromium (VI) can penetrate intact human skin, and dermal uptake is increased if the skin is damaged (ATSDR, 2012). In some cases, dermal uptake was sufficient to result in signs of toxicity. The form and the vehicle greatly influence the rate of dermal uptake.

Inhaled particles of chromium compounds can remain in the lungs for years (ATSDR, 2012). Chromium absorbed into the blood is distributed throughout the body with highest levels frequently located in the kidneys. Chromium has been shown to cross the placenta and to be excreted via lactation. Autopsy studies in the US show that highest concentrations in newborns occur in the kidney, liver, aorta, heart, pancreas and spleen, and that tissue levels decline with age.

The main feature of the metabolism of chromium involves reduction of chromium (VI) to chromium (III) via the formation of chromium (V) and chromium (IV) intermediates (ATSDR, 2012). Reduction of chromium (VI) to chromium (III) occurs in the acid milieu of the stomach, primarily by reaction with ascorbate. Ascorbate, glutathione and other substrates effectively reduce absorbed chromium (VI) to chromium (III). Chromium (III) is considered a nutritionally essential element required for the proper metabolism of glucose, proteins and lipids. It acts as part of a complex known as GTF, which facilitates the action of insulin. Although chromium (III) complexes are generally thought to be inert, there is recent evidence that chromium (III)

may be reduced to chromium (II), which could catalyze the Haber-Weiss reaction resulting in the production of genotoxic hydroxyl radicals.

Absorbed chromium is excreted primarily in the urine (ATSDR, 2012).

4.0 Dermal Exposure

EPA (2004a) recommends GAFs of 0.013 for chromium (III) and 0.025 for chromium (VI), generally consistent with the toxicokinetic data reviewed above, which are used in this evaluation. The GAF of 0.013 for chromium (III) should be used for total chromium, which is assumed to consist of 6 parts of chromium (III) to 1 part of chromium (VI) (EPA, 2004b, 2013).

Data were not located regarding the extent of dermal uptake of chromium from soil, and EPA (2004a) provides no estimate of the extent of dermal absorption (ABS). EPA (2004a) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. EPA (2004a) compiled *in vivo* and *in vitro* data from human experiments of dermal uptake of chromium from water. Average K_p values of 1E-4 cm/hour and 1E-3 cm/hour are estimated for chromium (III) and chromium (VI), respectively. The K_p of 1E-4 cm/hour for chromium (III) should be used for total chromium as explained above.

5.0 Noncancer Effects Evaluation

As mentioned above, chromium (III) is an essential nutrient involved in maintenance of normal metabolism (ATSDR, 2012). EPA (2013) verified an RfD of 1.5E+0 mg/kg-day for chronic oral exposure to chromium (III) by applying an uncertainty factor of 1000 to a NOEL of 1800 g/kg (1.468 mg/kg body weight/day) as an average total ingested dose in a dietary study in which rats were given 600 feedings of chromic oxide baked into bread. No other dose levels were tested. Confidence in the RfD is low. No target organ or critical effect was identified for the toxicity of oral exposure to chromium (III).

The available data do not suggest a significant difference between chronic and subchronic exposure regarding the threshold for the noncancer effects of chromium (III). Therefore, EPA (1997) adopted the verified chronic oral RfD, which at the time was listed on IRIS as 1E+0 mg/kg-day, as the provisional subchronic oral RfD for chromium (III). Subsequently, EPA (2013) recalculated the average daily dose, which led to revising the chronic oral RfD from 1E+0 to 1.5E+0 mg/kg-day. Since the only change between the earlier and the present verified oral RfD reflects a recalculation, it is recommended that the current verified chronic oral RfD of 1.5E+0 mg/kg-day should also be used for subchronic exposure.

EPA (20113) verified an RfD for chronic oral exposure to chromium (VI) of 3E-3 mg/kg-day based on a NOAEL of 25 mg/L (2.5 mg/kg-day) in the drinking water of rats exposed for one year. An overall uncertainty factor of 900 was applied. The uncertainty factor consists of factors of 10 each for inter- and intra-species variation, a factor of 3 to expand from subchronic to chronic exposure, and a modifying factor of 3 to address concerns that relatively low levels may induce GI effects and possibly some forms of cancer in humans. Inclusion of the modifying factor of 3 was a (EPA, 1998a) revision to a previously verified derivation. EPA (2013) notes that confidence in the chronic oral RfD is low.

EPA (1997) presented a provisional subchronic oral RfD of 2E-2 mg/kg-day for chromium (VI) based on the same drinking water study and an uncertainty factor of 200 (not otherwise explained). Presumably, this derivation reflects the earlier IRIS evaluation before inclusion of the modifying factor of 3. However, the concern for GI effects that gave rise to the modifying factor could apply to subchronic as well as chronic exposure. Therefore, it is recommended that a new preliminary subchronic oral RfD should be calculated for chromium (VI). This is done by applying an overall uncertainty factor of 300 to the NOAEL of 2.5 mg/kg-day from the drinking water study. The uncertainty factor of 300 reflects the overall uncertainty factor of 900 used for the chronic RfD without the factor of 3 to expand from subchronic to chronic exposure. The preliminary subchronic oral RfD for chromium (VI) so calculated is 8E-3 mg/kg-day.

Inhalation (occupational) exposure to chromium may induce respiratory symptoms, changes in lung function and irritation, erosion or perforation of the nasal septum, depending in part on the exposure level (EPA, 2013). No adverse effects were observed in workers exposed to 1E-3 mg/m^3 for 0.2 to 23.6 years (average 2.5 years). EPA (1998b, 2013) reviewed several human and animal studies, and determined that effects observed from inhalation exposure to chromium (VI) are not relevant to exposure to chromium (III). EPA (1998c) concluded that chromium (VI) is the only form of chromium of concern for inhalation exposure.

EPA (2013) developed separate chronic inhalation RfC values for human exposure to chromic acid mists and dissolved chromium (VI) aerosols, and for exposure to chromium (VI) particulates. A verified chronic inhalation RfC of 8E-6 mg/m^3 for chromic acid mists and dissolved chromium (VI) aerosols is based on an adjusted LOAEL of 7.14E-4 mg/m^3 associated with atrophy of the nasal septum in subchronically occupationally exposed humans. An overall uncertainty factor of 90 was used, consisting of factors of 10 for intraspecies variation, 3 to estimate a NOAEL from a LOAEL, and 3 to expand from subchronic to chronic exposure. Confidence in the inhalation RfC is low. The upper respiratory tract is considered the target organ for inhalation exposure to chromic acid mists and dissolved chromium (VI) aerosols. The chronic inhalation RfC is equivalent to a chronic inhalation RfD of 2.3E-6 mg/kg-day.

Inhalation exposure to chromium (VI) particulates is associated with pneumocyte toxicity; i.e., with effects on the lungs themselves. EPA (2013) derived an RfC of 1E-4 mg/m^3 for chronic inhalation exposure to chromium (VI) particulates from an adjusted benchmark concentration of 3.4E-2 mg/m^3 associated with altered enzyme activity in bronchioalveolar lavage fluid from rats exposed to sodium dichromate dust intermittently for up to 90 days. An uncertainty factor of 300 was used, consisting of a factor of 10 to provide additional protection to unusually sensitive individuals, and factors of 3 each to cover for physiologic differences between rats and humans, and to expand from subchronic to chronic exposure. Confidence in the RfC is medium. The RfC is equivalent to a chronic inhalation RfD of 2.9E-5 mg/kg-day. The lung is considered to be the target organ for chronic inhalation exposure to chromium (VI) particulates.

No current EPA-derived subchronic inhalation evaluation exists for chromic acid mists and dissolved chromium (VI) aerosols. However, a preliminary subchronic inhalation RfC can be derived by excluding the uncertainty factor of 3 for expanding from subchronic to chronic exposure. Application of the remaining overall uncertainty factor of 30 to the adjusted LOAEL of 7.14E-4 mg/m^3 yields a preliminary subchronic inhalation RfC of 2E-5 mg/m^3 for chromic acid mists and dissolved chromium (VI) aerosols. The preliminary subchronic inhalation RfC is equivalent to a subchronic inhalation RfD of 6.8E-6 mg/kg-day.

No current EPA-derived subchronic inhalation evaluation exists for chromium (VI) particulates. However, a preliminary subchronic inhalation RfC can be derived by excluding the uncertainty factor of 3 for expanding from subchronic to chronic exposure. Application of the remaining overall uncertainty factor of 100 to the adjusted LOAEL benchmark concentration of 3.4E-2 mg/m^3 yields a preliminary subchronic inhalation RfC of 3E-4 mg/m^3 for chromium (VI) particulates. The preliminary subchronic inhalation RfC is equivalent to a subchronic inhalation RfD of 9.7E-5 mg/kg-day.

EPA (1998c) noted that exposure to chromic acid mists and dissolved chromium (VI) aerosols is likely to be restricted to occupational settings and that most environmental exposures would involve exposure to chromium (VI) particulates. Therefore, the chronic inhalation RfC and RfD for chromium particulates will be used in this evaluation.

6.0 Carcinogenicity Evaluation

EPA (2013) classified chromium (III) in cancer weight-of-evidence group D – not classified as to carcinogenicity to humans – because of inadequate data. Chromium (VI) is classified in cancer weight-of-evidence group A – known human carcinogen – based on the consistent finding of lung cancer in epidemiologic studies of occupationally exposed workers in chromate production and the chrome pigment industry (EPA, 2013). Conclusions regarding the human data are corroborated by data from animal experiments. There is no evidence that oral exposure to chromium (VI) induces cancer, and EPA (2013) assigned chromium (VI) to Group D for oral exposure.

An inhalation URF of 1.2E-2 per $\mu g/m^3$, equivalent to an inhalation SF of 4.2E+1 per mg/kg-day, was based on increased risk of lung cancer deaths in chromate production workers (EPA, 2013). It should be noted that the quantitative assessment is based on the concentration of total chromium to which the workers were exposed, including insoluble (trivalent) and soluble (hexavalent) forms. It was assumed that chromium (VI) constituted not less than one-seventh of the total chromium; i.e., a ratio of 1 part of chromium (VI) to 6 parts of chromium (III). However, the forms of chromium in the air were not identified, and chromium (VI) may have constituted a significantly much greater portion of total airborne chromium. EPA (2013) presented the URF of 1.2E-2 per $\mu g/m^3$ as a verified potency estimate for chromium (VI), but noted that this estimate may underestimate the potency of exposure to pure chromium (VI) by as much as seven-fold.

7.0 Toxicity Summary

Toxicity values for chromium (III) and chromium (VI) are summarized below. Theoretical noncancer toxicity values are calculated for total chromium assuming a chromium (III)/chromium (VI) ratio of 6 to 1. Note that the URF is based on a mixture of chromium (III) and chromium (VI).

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Chromium (III)										
1.5E+0	1.5E+0	ND	ND	ND	NA	D	ND	D	ND	ND
Chromium (VI)[b]										
8E-3	3E-3	ND	3E-4/ 9.7E-5	1E-4/ 2.9E-5	Lu	D	ND	A	1.2E-2	4.2E+1
Total Chromium[c]										
NA	2.1E-2	ND	NA	7E-4/ 2.0E-4	Lu	D	ND	A	1.2E-2	4.2E+1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: Lu = lung.
[a]sRfDo and cRfDo should be adjusted by the appropriate GAF values described above when used for dermal exposure.
[b]Inhalation RfC/RfD values listed are those for chromium (VI) particulates. Values for chromic acid mists and dissolved chromium (VI) aerosols are not relevant to environmental exposures.
[c]For noncancer effects is based on the assumption that total chromium consists of 1 part of chromium (VI) and 6 parts of chromium (III); note that the URF assumed a mixture of chromium (III) to chromium (VI) at a ratio of approximately 6:1 (EPA 2013; EPA, 2004b).

8.0 References

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COBALT (7440-48-4)

1.0 Introduction and Physical Properties

Cobalt is a relatively scarce **metal**, constituting about 0.001 percent of the earth's crust (Elinder and Friberg, 1986). It often occurs in association with nickel, silver, lead, copper and iron ores. Cobalt is used in forming special metal alloys with unusual and useful properties (ATSDR, 2004; HSDB, 2013). It is also used in cutting materials, lacquers, varnishes, paint driers, enamels, inks, glazes, glass manufacture, as a catalyst in petroleum refining, and as a supplement in animal and human nutrition. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
58.93[a]	NA	NA	45[b]	NA	NA	ND	Note 1[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Cobaltous chloride as a typical cobalt salt: soluble.
[a]Hazardous Substance Data Bank (HSDB), 2013, National Library of Medicine, on line.
[b]Baes, C.F., R.D. Sharp, H. Sjoreen, and R.W. Shor, ***A Review and Analysis for Assessing Transport of Environmentally Released Radionuclides through Agriculture, ORNL-5786, Oak Ridge National Laboratory*** .
[c]Budavari, S, Ed., 1989, ***The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals***, Eleventh Edition, Merck & Co., Rahway, NJ.

2.0 Environmental Fate and Transport

Cobalt is released to the environment, particularly to the air, largely from industrial processes that involve grinding or polishing hard metal devices that contain cobalt (HSDB, 2013). Other anthropogenic sources include fossil fuel burning, vehicular and aircraft exhaust, production and use of cobalt-containing alloys and chemicals, copper and nickel smelting and refining, disposal of sewage sludge, and application of fertilizers derived from phosphate rock (ATSDR, 2004). Natural sources include soil and soil dust, seawater spray, and volcanic eruptions. Natural releases to the atmosphere slightly exceed anthropogenic releases.

Ionic cobalt compounds exist in the particulate phase in air and these compounds may be removed from the air by wet and dry deposition (HSDB, 2013).

HSDB (2013) reports that K_d values for cobalt range from 0.2 to 3,800 L/kg. The value of 45 L/kg presented above appears to be a reasonable intermediate point. Soils with higher pH and content of clay, natural organics, and hydrous manganese and iron oxides, bind cobalt to a greater degree; as these factors decrease, the mobility of cobalt increases. Microbial activity may increase the solubility of cobalt in soil. Chelating agents increase the solubility of cobalt and enhance its mobility in soil. Cobalt compounds do not volatilize from moist or dry soil surfaces due to their ionic character.

The transport and speciation of cobalt in natural waters and sediments is complicated by many factors (HSDB, 2013). The presence of sewage-derived organics appears to enhance the solubility of cobalt in freshwater by forming soluble complexes. Cobalt exists in the +2 or +3

oxidation state for the majority of its compounds and complexes. Volatilization from water surfaces is not expected, due to the ionic nature of dissolved cobalt compounds.

A few plant species are known to accumulate cobalt; however, translocation to aerial parts is generally insignificant (ATSDR, 2004; HSDB, 2013). Cobalt is bioaccumulated by aquatic organisms, particularly at the lower trophic levels. Biomagnification, however, does not occur and cobalt localizes in the viscera and on the skin, rather than in edible tissues. Therefore, cobalt is not expected to impact human health through the food-chain pathways and biotransfer factors are not provided.

3.0 Toxicokinetics

Inhaled cobalt particles deposit in the upper or lower respiratory tract, depending largely on particulate size (ATSDR, 2004). Uptake may occur by dissolution or phagocytosis; larger particles are removed by ciliary clearance. The extent of pulmonary uptake depends largely on particle size distribution.

GI absorption of ingested cobalt in humans ranges from 18 to 97 percent, depending on the form and dose, and on the nutritional status of the subjects (ATSDR, 2004). Cobalt is absorbed more efficiently in cases of iron deficiency. Animal studies show that soluble forms such as cobalt chloride are absorbed to a much greater extent (13 to 34 percent) than insoluble cobalt oxide (1 to 3 percent).

Experiments with humans indicate that cobalt in hard metal dust can be absorbed through the skin, although the rate or extent of uptake were not quantified (ATSDR, 2004). Experiments in animals indicate that cobalt is absorbed much more efficiently through abraded than intact skin.

Distribution of cobalt within body tissues depends in large measure on the route of exposure (ATSDR, 2004). Cobalt as a component of cyanocobalamin (vitamin B12) is generally distributed among the body tissues. Highest levels following inhalation exposure are found in the tissues and lymph nodes of the respiratory tract. Lesser but elevated levels are found in liver, spleen and kidney. Highest levels are found in the liver following ingestion exposure.

Elimination also depends on route of exposure (ATSDR, 2004). Inhaled particulates are cleared by mucociliary elevation, phagocytosis and dissolution. Elevated particles are swallowed and subjected to GI absorption or throughput in the feces. Absorbed cobalt is excreted primarily through the urine.

4.0 Dermal Exposure

The provisional chronic oral RfD of 3E-4 for cobalt was derived from a study in which humans were treated orally with cobalt (EPA, 2008). A GAF of 1, as recommended by EPA (2004) is selected for cobalt.

Data were not located regarding the extent of dermal uptake of cobalt from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. The EPA (2004) K_p for cobalt of 4E-4 cm/hour is selected for cobalt.

5.0 Noncancer Effects Evaluation

Human health effects following oral exposure to cobalt include decreased iodine uptake by the thyroid, dermatitis in sensitized individuals, increased erythrocyte production and hemoglobin levels, and cardiomyopthy. Related effects to each of these, except dermatitis, are supported by animal studies. Other effects observed in animal studies include neurobehavioral and testicular; these effects were observed only at relatively high doses. Thyroid toxicity was selected as the critical effect for the derivation of provisional oral reference doses.
Cobalt is nutritionally essential as a cofactor in cyanocobalamin ATSDR, 2004). The element is ubiquitous and universally present in the diet. Data from a dietary survey performed in the 1980s indicate that daily U.S. dietary intakes of cobalt are in the range of 3E-3 to 1.1E-2 mg/day (4E-5 to 2E-4 mg/kg-day, assuming an average body weight of 70 kg). Chronic ingestion from the consumption of beer containing high concentrations of cobalt is associated with "beer-cobalt cardiomyopathy," which includes polycythemia and goiter, as well as marked myocardial degeneration and mortality. However, confounding variables were identified and a dose-response could not be derived from the associated studies (EPA, 2008).

A consistently produced effect of exogenously administered cobalt in humans is the erythropoietic effect of stimulating erythrocyte production resulting in increased blood hemoglobin concentration (EPA, 2002). Cobalt chloride has been used therapeutically at dose rates of 1.6E-1 to 3.2E-1 mg cobalt/kg-day in anemic, anephric dialysis patients for 12 to 32 weeks to induce a significant, but reversible, rise in blood hemoglobin concentration. Clinical studies demonstrating this effect identified an effect level of 1.8E-1 mg/kg-day, which EPA (2002) had previously designated a LOAEL. However, EPA (2008) has since identified confounding variables, and has judged the effects of cobalt in some of the patients in pertinent studies as beneficial rather than adverse. A LOAEL of 1 mg/kg-day for subchronic thyroid toxicity as the critical oral effect was identified by EPA (2008) from a subchronic study by Roche and Layrisse (1956). A provisional subchronic RfD of 3E-3 mg/kg-day was derived assuming a composite UF of 300. This assumes a UF of 10 for LOAEL to NOAEL conversion, and a UF of 10 for inter-individual variability. An additional UF of 3 was added due to a lack of multigenerational studies, since testicular degeneration and sperm function were noted in some animal studies.

The provisional chronic oral RfD of 3E-4 mg/kg-day was derived as described for the subchronic RfD, with an additional UF of 10 added to extrapolate from subchronic to chronic exposure for a composite UF of 3,000 (EPA, 2008). Confidence in the principal study is described as low-to-medium.

The human and animal database indicate that symptoms of inhaled cobalt include respiratory tract irritation and altered pulmonary function. There were identified as the critical effects for exposure to inhaled cobalt for the derivation of RfDs. A NOAEL adjusted for continuous exposure of 1.9 $\mu g/m^3$ was identified by EPA (2008). A subchronic RfC of 2E-5 mg/m^3 was derived by EPA (2008) assuming a composite UF of 100, assuming a UF of 10 for database insufficiencies and a UF of 10 for inter-individual variability. The preliminary subchronic inhalation RfC is equivalent to a preliminary subchronic inhalation RfD of 5.7E-5 mg/kg-day.

A provisional chronic RfC of 6E-6 mg/m3 was derived as described above for the subchronic RfC, but with an additional UF of 3 for the extrapolation from subchronic to chronic exposure (EPA, 2008). Thus, the composite UF is 300. This provisional RfC equals an inhalation RfD of 1.7E-6 mg/kg-day.

6.0 Carcinogenicity Evaluation

Human or animal studies examining the carcinogenicity of cobalt associated with oral exposure were not located. Therefore, cobalt is classified as having "inadequate information to assess carcinogenic potential" via the oral pathway, thus no cancer slope factor was derived (EPA, 2008).

Cobalt is described as "likely to be carcinogenic to humans by the inhalation route," based on limited evidence of carcinogenicity in humans (occupational studies) and sufficient evidence of carcinogenicity in animals (EPA, 2008). Respiratory tract tumors have been suggested in occupational studies as the result of inhaled cobalt. Statistically increased incidence of respiratory tract tumors have been observed in animal studies. Limited evidence supports genotoxicity and cytotoxicity, followed by cellular regeneration as potential modes of cobalt tumorigenicity. A mutagenic effect may be plausible for inhaled cobalt, but has not been clearly established (EPA, 2008).

Human inhalation studies were not sufficiently detailed to use in the derivation of a URF. Rats and mice exposed via inhalation to cobalt sulfate heptahydrate for 2 years developed alveolar and bronchial lung tumors (neoplasms and adenomas). EPA (2008) identified a benchmark dose level of In the absence of an identified mode of action, EPA developed a provisional URF by linear extrapolation of benchmark dose level of 0.011 mg/m^3. Using a benchmark response of 10 percent in extra risk, a provisional URF of 9E-3$(\mu g/m^3)^{-1}$ was derived for cobalt sulfate. This equals an inhalation SF of 3.2E+1 $(mg/kg\text{-}day)^{-1}$.

7.0 Toxicity Summary

Toxicity values for cobalt are summarized as follows:

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
3E-3	3E-4	Thyroid	2E-5/5.7E-5	6E-6/ 1.7E-6	RT	ND	ND	B	9E-3	3.2E+1

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: RT = respiratory tract.

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IRON (7439-89-6)

1.0 Introduction and Physical Properties

Iron is a very abundant, ubiquitous, naturally occurring **metal** that constitutes approximately 5 percent of the earth's crust (Spivey Fox and Rader, 1988). It is the second most prevalent metal in the earth's crust following aluminum (HSDB, 2013). Its primary use is in making steels and other metals that have a wide range of application. Less than one percent of iron is used to make iron compounds that have application in dyes and pigments, water treatment, organic chemical synthesis, and medicinal preparations. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
55.85[a] (Element)	NA	NA	25[b]	NA	NA	ND	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable; ND = no data.
Note 1: Ferrous sulfate as a typical iron salt: soluble.
[a]Hazardous Substance Data Bank (HSDB), 2013, National Library of Medicine, on line.
[b] Baes, C.F., R.D. Sharp, H. Sjoreen, and R.W. Shor, ***A Review and Analysis for Assessing Transport of Environmentally Released Radionuclides through Agriculture, ORNL-5786, Oak Ridge National Laboratory***.

2.0 Environmental Fate and Transport

There is little information available regarding the anthropogenic release of iron and its fate in the environmental, probably because of its prevalence in nature. Clearly, however, mining and handling of iron ores releases dust containing iron oxides (HSDB, 2013). Presumably the manufacture and use of iron compounds may result in release to the environment, but data were not located.

Insoluble iron compounds are most likely to occur in air as particulates, and are expected to deposit to soil and surface water (HSDB, 2013). Although data are unavailable, soluble compounds are expected to leach to groundwater, and to remain in solution in both groundwater and surface water. The extent of partitioning to sediment is expected to depend on water pH, organic matter and reduction-oxidation potential of the water system.

Biouptake of iron is known to occur, because the element is a nutritionally required trace element that is a structural component of heme proteins and some enzymes, which are common to mammals and several other orders of living organisms (Spivey Fox and Rader, 1988). However, there is no evidence that iron bioconcentrates in either aquatic or terrestrial food chain pathways. Therefore, biotransfer factors for iron are not presented.

3.0 Toxicokinetics

The GI absorption of iron is regulated by homeostatic mechanisms sited largely in the intestinal mucosa (Goyer, 1991; EPA, 2006). Approximately 2 to 15 percent of dietary iron is ordinarily absorbed; however, several dietary factors may increase or decrease absorption (HSDB, 2013). Dietary iron from animal sources is absorbed more readily (10 to 25 percent) than iron from vegetables and grains (1 to 10 percent) (Elinder, 1986). Absorption is greatly increased at times

of unusual need (rapid growth of childhood, pregnancy, blood loss). Divalent (ferrous) iron is absorbed into the intestinal mucosal cells and released to the blood plasma where it is oxidized to the trivalent (ferric) form, which binds with a specific protein, transferrin, for transport to storage sites.

Approximately 67 percent of iron in the body is associated with hemoglobin in the erythrocytes, 10 percent is associated with myoglobin and various iron-containing enzymes, and the remainder is bound to ferritin or hemosiderin, which are intracellular storage forms (Goyer, 1991). Ferritin and hemosiderin bind iron in a manner that renders it inactive for beneficial use (e.g., hemoglobin synthesis) and inactive as a toxicant. Some of the iron taken up by the cells of the reticuloendothelial system remains stored and some enters a labile pool that is available for erythropoiesis.

Excess iron is generally excreted, in part in shed intestinal epithelial cells, or in the bile or urine (Goyer, 1991). In cases of very high iron intake, excretion may be unable to remove iron as quickly as it is absorbed. Iron overload results, which stimulates increased synthesis of ferritin and increased iron storage, particularly in the liver, pancreas, spleen, various endocrine organs and the heart.

4.0 Dermal Exposure

As noted above, the GI absorption of iron appears to be under homeostatic control in normal humans (EPA, 2006), which suggests that GI absorption could vary widely between individuals depending on nutritional status. Given the uncertainty about the GI absorption of iron, a default GAF of 1 (EPA, 2004) is chosen for this evaluation.

Data were not located regarding the extent of dermal uptake of iron from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of iron from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for iron.

5.0 Noncancer Effects Evaluation

Iron is a nutritionally required trace element that forms an integral part of hemoglobin, myoglobin and several enzymes (Spivey Fox and Rader, 1988). The NAS (1989) Recommended Daily Allowance (RDA) for iron is 10 mg/day (0.13 mg/kg-day) for adult males; 15 mg/day (0.24 to 0.33 mg/kg-day) for females aged 11 to 50 years; 30 mg/day (0.443 mg/kg-day) for pregnant females; and 10 mg/day (0.36 to 1.11 mg/kg-day) for children aged 6 months to 10 years.

Both acute and chronic toxicity syndromes are associated with ingestion exposure to iron. Acute toxicity generally involves children (Goyer, 1991). Acute ingestion of large quantities (e.g., children may ingest several ferrous sulfate tablets with candy-like coating) results in severe GI irritation and, in some cases, liver damage. Liver cirrhosis and blood coagulation defects (indicative of reduced circulating levels of blood clotting factors produced by the liver) are observed as sequellae to severe acute toxicity.

Three chronic toxicity syndromes that result in iron overload have been observed in humans (Goyer et al., 1991). The first chronic syndrome is idiopathic hemochromotosis, which arises from a genetic derangement of the homeostatic mechanisms that control iron absorption. This syndrome involves greatly increased GI absorption of iron, regardless of the level of iron in the diet, which results in massive iron overload.

The second chronic syndrome is iron overload resulting from high dietary intake (Goyer, 1991). Although high dietary intake seldom results in iron overload in humans with normal homeostatic control of iron absorption, rare exceptions occur (EPA, 2006). One such exception is the occurrence of iron overload in Bantus who regularly consumed Kaffir beer, an acid beer brewed in iron vessels. This syndrome is not entirely understood; however, the iron in Kaffir beer appears to have exceptionally high bioavailability – equivalent to that of nutritional iron supplements especially formulated for bioavailability – which may account for the increased absorption and iron overload. Other exceptions include persons who take large amounts of tonics or nutritional supplements containing iron.

The third chronic syndrome involves persons requiring multiple blood transfusions over a period of time (Goyer, 1991). This results in the parenteral administration of large quantities of iron that are released as the transfused erythrocytes expire and are removed from the circulation by the reticuloendothelial system. As noted above, excretion cannot keep up with unusually high circulating levels of iron, such as results from multiple blood transfusions. Clearly, the third syndrome has no relevance to environmental exposure.

Regardless of the chronic syndrome that produces it, the effects of iron overload involve the same pathogenesis (Goyer, 1991). Iron stores in the body increase from the normal level of 3 to 5 g, to levels of 20 to 40 g. The cells are induced to increase production of ferritin, which binds the iron cation inactivating its toxicity. Increasingly larger proportions of iron are located in hemosiderin than in ferritin. Hemosiderin is a larger storage protein, probably formed primarily from ferritin. The iron in hemosiderin is essentially completely unavailable and nontoxic. Hemosiderosis is the term given to large accumulations of hemosiderin that do not result in adverse effects because the iron is unavailable. Extremely large accumulations of hemosiderin that result in impaired cellular function is termed hemochromotosis. Hemochromotosis of the liver, endocrine glands and heart is associated with reduced liver function, eventually liver cirrhosis, pancreatic fibrosis, diabetes mellitus, other endocrine disruption and cardiovascular effects.

Goyer (1991) and EPA (2006) reviewed the available data regarding the toxicity of iron. Neither source located any data clearly associating *environmental* exposure with toxicity. EPA (1996) reviewed a study associating high circulating ferritin levels and high dietary iron intakes with myocardial infarction in Finnish men, but association with other factors (e.g., high levels of red meat consumption) confounds interpretation of this study. Furthermore, attempts to produce an animal model of chronic iron toxicity have failed, presumably because of the efficacy of the homeostatic mechanisms that regulate iron absorption from the GI tract.

EPA (1996) reasoned previously that a NOEL for chronic iron overload could be inferred from the estimates of dietary intake and iron status (circulating ferritin levels) established by the second National Health and Nutrition Examination Survey (NHANES II) data base. The NHANES II study determined that average dietary iron intakes, which ranged from 0.15 to 0.27

mg/kg-day, were associated with normal iron status. More recently, EPA (2006) has concluded that the assignment of a LOAEL based on iron overload for normal individuals cannot be determined based on existing data because of confounding factors in the studies.

EPA (2006) has determined that gastrointestinal toxicity, commonly associated with therapeutic use of iron supplements, is the critical effect. A provisional subchronic and chronic oral RfD of 0.7 mg/kg-day was derived, based on a LOAEL of 1 mg/kg-day and a UF of 1.5 (EPA, 2006). The same value was derived for both subchronic and chronic exposures because clinical experience with iron supplements indicates that the gastrointestinal irritation is associated with treatment and does not intensify with duration. Further, the effect is reversible once treatment is discontinued. A higher UF was not selected because of the reversibility and the effect is not regarded as serious (EPA, 2006).

Inhalation (occupational) exposure to iron oxide fumes may lead to radiographic densities in the lungs without demonstrable clinical effects (ACGIH, 1991). Inhalation of dusts or mists of ferric salts may irritate the respiratory tract. Inhalation data are insufficient for derivation of an inhalation RfC or RfD (EPA, 2005a).

6.0 Carcinogenicity Evaluation

Data regarding the potential carcinogenicity of iron were not located. Neither a cancer weight-of-evidence classification nor cancer potency factors are available (EPA, 2005b).

7.0 Toxicity Summary

Toxicity values for iron are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
7E-1	7E-1	GI	ND	ND	NA	ND	ND	ND	ND	ND

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: GI = gastrointestinal.
[a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.

In most cases, it is inappropriate to apply the toxicity values summarized above to environmental exposure.

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U.S. Environmental Protection Agency (EPA), 2006, ***Provisional Peer-Reviewed Toxicity Values for Iron and Compounds (CASRN 7439-89-6), Derivation of Chronic and Subchronic Oral RfDs***, National Center for Environmental Assessment, Cincinnati, OH, 29 July.

INORGANIC MANGANESE (7439-96-5)

1.0 Introduction and Physical Properties

Manganese is a naturally occurring **metal** found in the earth's crust in the form of numerous minerals such as pyrolusite, romanechite, manganite and hausmannite (ATSDR, 2012; HSDB, 2013; Keen and Leach, 1988). It occurs ubiquitously in the environment, constituting approximately 0.085 percent of the earth's crust, commonly in valence states of +2, +4 and +7; valences of +1, +3, +5 and +6 are rare. Manganese is used in the manufacture of steel, and in other metallurgical processes, batteries, and various manganese-containing chemicals including matches, glass and porcelain, fireworks, varnishes, ceramics, diagnostic contrast media and fungicides. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
54.938[a] (Elemental)	NA	NA	65[b]	NA	NA	NA	Note 1[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Metallic manganese decomposes in the presence of water. Manganous chloride as a typical manganese salt: 7.23E+5 mg/L (25° C).
[a]Hazardous Substance Data Bank (HSDB), 2010, National Library of Medicine, on line.
[b]Baes, C.F., R.D. Sharp, A.L. Sjoreen, R.W. Shor, 1984, ***A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture***, Health and Safety Division, Oak Ridge National Laboratory, ORNL-5786, September.
[c]Agency for Toxic Substances and Disease Registry, (ATSDR), 2000, ***Update Toxicological Profile for Manganese***, U.S. Public Health Service, Atlanta, Georgia, September, on line.

2.0 Environmental Fate and Transport

Inorganic manganese compounds enter the atmosphere and other environmental compartments from the weathering of rocks and windblown soil (HSDB, 2013). Anthropogenic sources of atmospheric manganese include metal processing, disposal and use of manganese-containing materials (antiseptics, catalysts, dietary supplements, dry cells, feed additives, fertilizers, pesticides and pigments), resuspension of manganese-containing soil dust, and fly ash emissions from incinerators (ATSDR, 2012; HSDB, 2013). Another source of atmospheric manganese is the combustion of gasoline containing organic manganese anti-knock ingredients such as methylcyclopentadienyl manganese tricarbonyl (MMT). It is unclear whether manganese from this source remains as an organic form or is converted to an inorganic form. The use of MMT in gasoline has been discontinued because of deleterious effects on catalytic converters. Manganese may be released to water by discharge from industrial facilities or in leachate from landfills and soil. Landfill disposal of manganese-containing wastes is the predominant source of manganese release to soil.

Manganese exists in the air bound to particles; dry deposition is the primary removal mechanism, although wet deposition may also be significant (ATSDR, 2012). Manganese in fly ash exists as chlorides and oxides that are relatively soluble and mobile in the environment.

Manganese in water exists as any of several sparingly soluble salts that attach to suspended sediment (ATSDR, 2000). Sedimentation is the primary removal process. Soluble forms also exist, depending on pH of the water, and may be released from sediment. The extent of

absorption to constituents of soil is highly variable. Low concentrations may irreversibly bind to clay, but higher concentrations often manifest considerable mobility.

Manganese may accumulate in various kinds of plants such as legumes, nuts, heather, and tea, and in the lower aquatic trophic levels, but not significantly in the higher aquatic trophic levels or most terrestrial animals (ATSDR, 2012; HSDB, 2013). This indicates that food-chain pathways are unlikely to be significant for human health; therefore, biotransfer factors are not compiled or estimated.

3.0 Toxicokinetics

Manganese is nutritionally essential for humans (ATSDR, 2012). Stable tissue levels are maintained by homeostatic regulation of GI absorption and biliary excretion.

Manganese is absorbed by the respiratory tract (ATSDR, 2012), although data quantifying the extent of absorption were not located. Smaller particles are probably retained in the lung eventually to be absorbed; larger particles are probably removed by mucocilliary elevation and swallowed so that they become available for GI absorption. The more soluble compounds are more readily absorbed by the respiratory tract. Studies in rats given radiolabeled manganese by intranasal administration suggest that olfactory uptake and direct transmission to the brain may occur.

GI absorption of manganese in humans averages 3 to 5 percent, but homeostatic mechanisms reduce the extent of absorption at higher doses (ATSDR, 2012). The more soluble compounds are more readily absorbed. Iron deficiency enhances manganese uptake. Absorption appears to be more efficient and resulting tissue levels appear to be higher in infants than adults.

Quantitative data regarding dermal uptake of manganese were not located.

Normal tissue levels of manganese in humans range from 0.1 to 1 mg/kg wet weight with highest levels in liver, pancreas and kidney, and lowest levels in bone and fat (ATSDR, 2012). Animal studies (inhalation, intranasal, intratracheal and oral administration) confirm that many tissues including the brain, and in some instances specific regions of the brain, show significant increases in manganese levels after treatment. Tissue levels recede toward normal after treatment ceases.

Metabolism of manganese appears to be limited to oxidation-reduction changes in valence state (ATSDR, 2000). The evidence suggests that manganese (+2) is oxidized to manganese (+3), which alters its tissue distribution and slows excretion. Manganese is removed from the blood in the liver and is excreted principally through the bile. Urine, sweat and milk represent minor excretory routes. Animal studies show that the young are less efficient than adults in excreting manganese, although the young do not appear to be more sensitive to its effects.

4.0 Dermal Exposure

Data were not located regarding the extent of dermal uptake of manganese from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of

uncertainty. Empirical data regarding the uptake of soluble forms of manganese from water were not located. ATSDR (2012), however, notes that the uptake of manganese across intact skin is insignificant with respect to exposure, suggesting that uptake of toxicologically significant amounts is unlikely. EPA (2004) provides no chemical-specific estimate of K_p for manganese; therefore, the default K_p value of 1E-3 cm/hr is used to estimate dermal uptake of manganese from water.

5.0 Noncancer Effects Evaluation

Manganese is nutritionally required by humans for normal growth and health (EPA, 2010). Humans exposed to approximately 0.8 mg manganese/kg-day in drinking water (28 mg/L) exhibited lethargy, increased muscle tonus, tremor and mental disturbances. The elderly appeared to be more sensitive than children. Oral treatment of laboratory rodents induces biochemical changes in the brain, but rodents do not exhibit the neurological signs exhibited by humans.

EPA (2013) verified a chronic oral RfD for manganese of 1.4E-1 mg/kg-day from a NOAEL of 1.4E-1 mg/kg-day for neurologic effects from human dietary studies and an uncertainty factor of 1. Confidence in the RfD is medium. The oral RfD of 1.4E-1 mg/kg-day will be used for dietary items other than drinking water. EPA (2013) recommends that the contribution of background diet should be subtracted and that a modifying factor of 3 should be used to adjust for use when oral exposure involves drinking water and non-dietary ingestion. The oral RfD resulting from these manipulations is 2.4E-2 mg/kg-day, which will be used for drinking water and incidental ingestion of non-dietary items. The CNS is the target organ for chronic oral exposure to manganese. EPA (1997) effectually adopts the chronic oral RfD as sufficiently protective for subchronic oral exposure.

The NOAEL described above is associated with a dose rate of approximately 10 mg/day for an adult. However, EPA (2002) notes that normal intake levels may well exceed 10 mg/day, especially with diets containing substantial amounts of whole-grain cereals, nuts, green leafy vegetables, and tea. Adverse effects have not been reported at dietary levels of 10 mg/day. It is likely that larger dose rates are innocuous as well.

Occupational exposure to high concentrations in air induces a generally typical spectrum of neurological effects, and increased incidence of pneumonia (ACGIH, 1991). EPA (2013) presents a verified chronic inhalation RfC of 5E-5 mg/m^3 (equivalent to an inhalation RfD of 1.4E-5 mg/kg-day) based on a LOAEL for neurological effects in occupationally exposed humans and an uncertainty factor of 1000. The uncertainty factor consists of three factors of 10 each to provide additional protection for unusually sensitive individuals, to extrapolate a NOAEL from a LOAEL, and to address database limitations including the less-than-chronic periods of exposure, the lack of developmental toxicity data, and uncertainty regarding potential but unquantified differences in the toxicity of different forms of manganese. Confidence in the RfC is medium. The CNS is the target organ for inhalation exposure to manganese. The chronic inhalation RfC is adopted as sufficiently protective for subchronic inhalation exposure.

6.0 Carcinogenicity Evaluation

EPA (2013) classified manganese in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). Quantitative cancer risk estimates are not derived for Group D chemicals.

7.0 Toxicity Summary

Noncancer Effects						Carcinogenicity				
Oral Exposure			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
1.4E-1[a]/ 2.4E-2[b]	1.4E-1[a]/ 2.4E-2[b]	CNS	5E-5/ 1.4E-4	5E-5/ 1.4E-5	CNS	D	ND	D	ND	ND

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data.
Target organ or critical effect abbreviations: CNS = central nervous system.
[a]Dietary items other than drinking water.
[b]Ingestion of environmental media and drinking water.

8.0 References

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THALLIUM (7440-28-0)

1.0 Introduction and Physical Properties

Thallium is a naturally occurring metal with an abundance of about 0.3-0.6 ppm in the earth's crust (HSDB, 2013). Thallium compounds are used in a variety of applications, including pharmaceuticals, semiconductors, photoelectric cells, optical systems, ore separation, glass production, and as oxidizing agents in organic synthesis (ATSDR, 1992; HSDB, 2013). An important former use of thallium and its compounds (before 1972) was in pesticide formulations for the control of insects and rodents. Relevant physical properties are compiled below:

MW	log K_{ow}	H	K_d	D_a	D_w	VP	S
204.38[a] (Elemental)	NA	NA	7.1E+1[b,c]	NA	NA	NA	Note 1[a]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; K_d = soil/water partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; NA = not applicable.
Note 1: Thallium sulfate as a typical thallium salt: 4.87E+4 mg/L (20˚ C).
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 1992, ***Toxicological Profile for Thallium***, U.S. Public Health Service, Atlanta, Georgia, July, on line.
[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, OSWER 9355.4-24, December.
[c]pH = 6.8.

2.0 Environmental Fate and Transport

Thallium is released to the atmosphere largely from coal-burning power plants, cement factories, and ferrous and nonferrous smelting operations (ATSDR, 1992; HSDB, 2013). Facilities that produce or use thallium or its compounds account for a much smaller part of the total release.

Thallium in air exists as oxide, hydroxide, sulfate or sulfide particles (ATSDR, 1992; HSDB, 2013). The hydroxide and sulfate are water soluble and may partition to water vapor for eventual removal in precipitation. The less soluble particulate forms are probably removed by dry deposition.

Thallium released to surface water usually occurs as the monovalent ion that forms soluble salts with several anions (ATSDR, 1992; HSDB, 2013). Adsorption to suspended particulates may also occur, but the soluble forms remain in the water column.

Although empirical data are sparse, the high solubility of several thallium salts suggests that mobility in soil could be high and the potential for leaching could be significant (ATSDR, 1992).

Terrestrial plants have been shown to absorb thallium from soil, but there is no evidence that biomagnification occurs. EPA (1995) identifies thallium as a chemical unlikely to be of concern for bioaccumulation in aquatic food chains. For these reasons it is concluded that thallium is unlikely to participate significantly in food-chain pathways and biotransfer factors are not estimated or compiled.

3.0 Toxicokinetics

Data regarding absorption from the respiratory tract following inhalation exposure were not located; however, small particles are probably absorbed to some extent and larger particles are probably removed by mucocilliary clearance and swallowed, where they become available for GI absorption. Thallium compounds appear to be completely absorbed from the GI tract in humans and laboratory animals (ATSDR, 1992). Quantitative data regarding dermal uptake of thallium were not located, although HSDB (2013) states that absorption through the skin occurs readily.

Tissue levels in acutely poisoned humans appear to be highest in the brain in regions dense with neurons, such as the gray matter (HSDB, 2013). Tissue distribution testing in a single human volunteer cancer patient treated orally with a small dose of radiolabeled thallium indicated that highest concentrations were located in scalp hair followed by kidney, heart, bone, spleen and brain (ATSDR, 1992). Distribution in orally treat laboratory animals is rapid and widespread, with higher levels generally associated with the kidney. The rank of levels in other tissues is more variable (ATSDR, 1992), but high levels are ordinarily found in the testis (HSDB, 200).

The biological half-life in rats in one study was 3.3 days, indicating that excretion is efficient (ATSDR, 1992). Excretion in humans may be somewhat slower. Excretion appears to be primarily through the urine in humans, and through the urine and feces. However, the data are somewhat confusing because animal studies indicate that the ratio of fecal to urinary excretion increases with time. This suggests that biliary excretion and enterohepatic recirculation may be operative, which could result in underestimation of fecal excretion in the human study.

4.0 Dermal Exposure

As noted above, GI absorption of thallium is essentially complete. EPA (2004) concluded that a GAF should not be estimated for thallium for the purpose of adjusting oral toxicity values for dermal exposure. Therefore, the oral toxicity values described below are used directly without adjustment for evaluating dermal exposure.

Thallium may be readily absorbed by the skin (HSDB, 2013); however, data were not located regarding the extent of dermal uptake of thallium from soil, and EPA (2004) provides no estimate of the extent of dermal absorption (ABS). EPA (2004) recommends that dermal uptake from soil should not be quantified for chemicals without ABS recommendations, but that these chemicals should be discussed qualitatively as a source of uncertainty. Empirical data regarding the uptake of soluble forms of thallium from water were not located. The EPA (2004) default K_p for inorganic chemicals of 1E-3 cm/hour is selected for thallium.

5.0 Noncancer Effects Evaluation

Thallium is highly toxic. Acute oral exposure to thallium and its compounds may cause death preceded by neurological disturbances and effects on the lungs, heart and liver (ATSDR, 1992). Formerly, thallium was used medicinally to induce alopecia to facilitate treatment of ringworm of the scalp, sometimes with disastrous results. The critical effect of chronic oral exposure to low levels of thallium compounds in animals and humans is alopecia (ACGIH, 1992; EPA, 2013). EPA (2013) had previously verified chronic oral RfDs for several thallium salts (thallium acetate, thallium carbonate, thallium chloride, thallium nitrate and thallium sulfate) based on a study with thallium sulfate; these RfDs were removed from IRIS in September 2009. Currently, no RfD exists for thallium, thallium salts, or thallium compounds because of insufficient toxicity

data (EPA, 2013). Toxicity data were also insufficient for the development of a peer-reviewed provisional toxicity value (PPRTV) RfD (EPA, 2012).

The previous oral RfD that had been listed on IRIS for thallium sulfate of 8E-5 mg/kg-day was based on a NOAEL of 0.25 mg/kg-day in rats treated by gavage with thallium sulfate for 90 days. No adverse effects were seen in this study. An uncertainty factor of 3000 was used, consisting of factors of 10 each to extrapolate from subchronic to chronic data, for intraspecies extrapolation and to account for interspecies variability, and a factor of 3 to account for lack of reproductive and chronic toxicity data. Confidence in the chronic RfD is low. The skin (alopecia) is considered the target organ for oral exposure to thallium, based on other data reviewed by EPA (2013). Effects on the testis and kidney were observed in rats exposed to higher dose rates. The chronic oral RfD for thallium sulfate of 8E-5, when adjusted for differences in molecular weight, is equivalent to a chronic oral RfD for thallium of 6.5E-5 mg/kg-day. This adjustment is based on the assumption that the toxicity of thallium sulfate is due entirely to thallium, rather than to the sulfate moiety. The oral RfD for thallium of 6.5E-5 mg/kg-day is used in this evaluation.

EPA (1997) provides a provisional subchronic oral RfD for thallium sulfate of 8E-4 mg/kg-day, equivalent to a subchronic oral RfD for thallium of 6.5E-4 mg/kg-day, based on the study discussed above and an uncertainty factor of 300, eliminating the factor of 10 to expand from subchronic to chronic exposure. EPA (1997) provides provisional subchronic chronic oral RfDs for several thallium salts (thallium acetate, thallium carbonate, thallium chloride, thallium nitrate and thallium sulfate) based on the same study with thallium sulfate.

Inhalation exposure data are very limited. An occupational study suggests that neurological effects may develop following prolonged inhalation exposure (ATSDR, 1992). The nervous system appears to be more sensitive than the skin as a target organ for inhalation exposure. The data are inadequate for estimation of an inhalation RfC or RfD.

6.0 Carcinogenicity Evaluation

Several thallium compounds (thallium oxide, thallium acetate, thallium carbonate, thallium chloride, thallium nitrate, thallium sulfate) are classified as cancer weight-of-evidence Group D substances (not classifiable as to carcinogenicity to humans) (EPA, 2013). No weight-of-evidence classification was located for thallium alone, but the Group D classification can be applied to thallium. Quantitative cancer risk estimates are not derived for Group D chemicals.

7.0 Toxicity Summary

Toxicity values for thallium are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
6.5E-4	6.5E-5	S,	ND	ND	NA	D	NA	D	NA	NA
sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo =										

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable. Target organ or critical effect abbreviations: S = skin (alopecia). [a]sRfDo and cRfDo should be used for dermal exposure without adjustment for GI absorption.										

8.0 References

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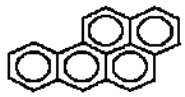
Semivolatile Organic Compounds

POLYNUCLEAR AROMATIC HYDROCARBONS a.k.a. POLYCYCLIC AROMATIC HYDROCARBONS a.k.a. POLYAROMATIC HYDROCARBONS (PAH) (130498-29-2)



Benzo(a)Pyrene
(A representative and the most studied member of this class of compounds.)

1.0 Introduction and Physical Properties

The PAHs regularly observed in environmental media and addressed in this profile include acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene. All exist as solids at room temperature. Classification as **SVOC** or **VOC** is made in the following table. PAHs are the products of incomplete combustion of fossil fuels or other organic matter, hence include both natural and anthropogenic sources (ATSDR, 1995; HSDB, 2013). Several are also components of crude oil. Naphthalene is used in the synthesis of phthalic anhydride, the insecticide carbaryl, leather tanning agents and surface active agents, and is a component of diesel and other fuels (ATSDR, 2005). Relevant physical properties are compiled below:

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
Acenaphthene (83-32-9) **(VOC)**										
154.21[a]	3.92[a]	1.55E-4[b] (25°C)	3.85[b]	4.21E-2[b] (25°C)	7.69E-6[b] (25°C)	3.29E-6[a] (25°C)	4.24E+0[b] (20-25°C)	550.54[c]	803.15[c]	1.22E+4[c]
Acenaphthylene (208-96-8) **(VOC)**										
152.20[a]	4.07[a]	1.13E-5[a] (25°C)	3.42[a]	6.67E-2[d] (25°C)[e]	7.72E-6[d] (25°C)[e]	1.20E-6[a] (25°C)	3.93E+0[a] (25°C)	543.2[a]	797[f]	1.1E+4[g]
Anthracene (120-12-7) **VOC)**										
178.23[a]	4.45[a]	6.51E-5[b] (25°C)	4.47[b]	3.24E-2[b] (25°C)	7.74E-6[b] (25°C)	3.51E-9[a] (25°C)	4.34E-2[b] (20-25°C)	615.18[c]	873.00[c]	1.31E+4[c]
Benzo(a)anthracene (56-55-3) **(SVOC)**										
228.3[h]	5.66[h]	3.34E-6[b] (25°C)	5.60[b]	5.10E-2[b] (25°C)	9.00E-6[b] (25°C)	2.50E-9[a] (25°C)	9.40E-3[b] (20-25°C)	708.15[c]	1004.8[c]	1.60E+4[c]
Benzo(a)pyrene (50-32-8) **(SVOC)**										
252.3[a]	6.10[h]	4.57E-7[i] (25°C)	6.01[b]	4.30E-2[b] (25°C)	9.00E-6[b] (25°C)	7.22E-12[a] (25°C)	1.62E-3[b] (20-25°C)	715.90[c]	969.27[c]	1.90+4[c]
Benzo(b)fluoranthene (205-99-2) **(VOC)**										
252.3[h]	6.12[h]	6.57E-7[i] (25°C)	6.09[b]	2.26E-2[b] (25°C)	5.56E-6[b] (25°C)	6.58E-10[a] (20°C)	1.50E-3[b] (20-25°C)	715.90[c]	969.27[c]	1.70+4[c]
Benzo(k)fluoranthene (207-08-9) **(SVOC)**										
252.32[a]	6.84[a]	8.29E-7[b] (25°C)	6.09[b]	2.26E-2[b] (25°C)	5.56E-6[b] (25°C)	1.28E-12[a] (25°C)	8.00E-4[b] (20-25°C)	753.15[c]	1019.7[c]	1.80E+4[c]
Benzo(g,h,i)perylene (191-24-2) **(SVOC)**										
276.34[a]	6.63[a]	2.66E-7[a] (20°C)	4.98[a]	4.48E-2[d] (25°C)[e]	5.19E-6[d] (25°C)[e]	1.3E-13[a] (25°C)	2.6E-4[a] (25°C)	823[a]	1097[f]	1.96E+4[g]
Chrysene (218-01-9) **(VOC)**										
228.3[h]	5.66[h]	9.46E-5[b] (25°C)	5.60[b]	2.48E-2[b] (25°C)	6.21E-6[b] (25°C)	8.20E-12[a] (25°C)	1.60E-3[b] (20-25°C)	714.15[c]	979.0[c]	1.65E+4[c]
Dibenz(a,h)anthracene (53-70-3) **(SVOC)**										
278.4[h]	6.84[h]	1.47E-8[b] (25°C)	6.58[b]	2.02E-2[b] (25°C)	5.18E-6[b] (25°C)	1.32E-13[a] (20°C)	2.49E-3[b] (20-25°C)	743.24[c]	990.41[c]	3.00E+4[c]
Fluoranthene (206-44-0) **(VOC)**										
202.3[h]	4.95[h]	1.61E-5[b] (25°C)	5.03[b]	3.02E-2[b] (25°C)	6.35E-6[b] (25°C)	1.21E-8[a] (25°C)	2.06E-1[b] (20-25°C)	655.95[c]	905.0[c]	1.38E+4[c]

MW	log K_{ow}	H	log K_{oc}	D_a	D_w	VP	S	T_b	T_c	$\Delta H_{v,b}$
Fluorene (86-73-7) **(VOC)**										
166.21[a]	4.18[i]	6.37E-5[b] (25°C)	4.14[b]	3.63E-2[b] (25°C)	7.88E-6[b] (25°C)	4.21E-7[a] (20°C)	1.98E+0[b] (20-25°C)	570.44[c]	870.0[c]	1.27E+4[c]
Indeno(1,2,3-cd)pyrene (193-39-5) **(SVOC)**										
276.3[h]	6.58[h]	1.60E-6[b] (25°C)	6.54[b]	1.90E-2[b] (25°C)	5.66E-6[b] (25°C)	1.71E-13[a] (25°C)	2.20E-5[b] (20-25°C)	809.15[c]	1078.2[c]	1.90E+4[c]
Naphthalene (91-20-3) **(VOC)**										
128.2[h]	3.30[h]	4.40E-4[k] (25°C)	3.30[b]	5.90E-2[b] (25°C)	7.50E-6[b] (25°C)	1.12E-4[a] (25°C)	3.10E+1[b] (20-25°C)	491.14[c]	748.40[c]	1.04E+4[c]
Phenanthrene (85-01-8) **(VOC)**										
178.2[h]	4.46[h]	1.24E-4[a] (25°C)	4.36[a]	6.00E-2[d] (25°C)[e]	6.95E-6[d] (25°C)[e]	8.95E-7[a] (25°C)	1.29E+0[a] (25°C)	613.2[a]	869.2[j]	1.42E+4[a]
Pyrene (129-00-0) **(VOC)**										
202.26[a]	4.88[a]	1.1E-5[b] (25°C)	5.02[b]	2.72E-2[b] (25°C)	7.24E-6[b] (25°C)	1.17E-7[a] (25°C)	1.35E-1[b] (20-25°C)	667.95[c]	936.0[c]	1.44E+4[c]

MW = molecular weight (g/mole); log K_{ow} = base 10 logarithm of the octanol/water partition coefficient (unitless); H = Henry's Law constant (atm-m^3/mole) at the reference temperature; log K_{oc} = base 10 logarithm of the soil/organic carbon partition coefficient (L/kg); D_a = diffusivity in air (cm^2/second); D_w = diffusivity in water (cm^2/second); VP = vapor pressure (atm) at the reference temperature; S = solubility in water (mg/L) at the reference temperature; T_b = normal boiling point (at 1 atm) of pure liquid compound (°K); T_c = critical temperature (°K);.$H_{v,b}$ = enthalpy of vaporization at the boiling point (cal/mole); ND = no data.

[a]Hazardous Substance Data Bank (HSDB), 2013, National Library of Medicine, on line.

[b]U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

[c]U.S. Environmental Protection Agency (EPA), 2000, ***User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings, Revised***, Office of Emergency and Remedial Response, Washington, DC, December.

[d]Calculated as described in Introduction to Toxicological profiles.

[e]Assumed.

[f]Estimated from Equation 12-4 in Lyman, W.J., W.F. Reehl and D.H. Rosenblatt, 1990, ***Handbook of Chemical Property Estimation Methods***, American Chemical Society, Washington, DC.

[g]Estimated from Equation 13-5 in Lyman, W.J., W.F. Reehl and D.H. Rosenblatt, 1990, ***Handbook of Chemical Property Estimation Methods***, American Chemical Society, Washington, DC.

[h]U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

[k]U.S. Environmental Protection Agency (EPA), 2012, *EPISuite electronic database*

.[j]National Institute of Standards and Technology (NIST), 2004, Standard Reference Data Program, Online Data Bases.

2.0 Environmental Fate and Transport

The PAHs are ubiquitous products of incomplete combustion; natural sources include volcanoes and forest fires (ATSDR, 1995, 2005; HSDB, 2013). There is some evidence for biosynthesis by plants, bacteria and algae. Some of the PAHs occur naturally in fossil fuels. Anthropogenic releases to the environment, primarily to the atmosphere, greatly outweigh the natural sources and include any processes that involve incomplete combustion of fossil fuels and organic matter, including wood-burning for home heat (the predominant source), cigarette smoke, internal combustion engine exhaust, and fuel oil emissions. Industrial sources include coal mining, processing and storing, wood treatment (creosote), manufactured gas plants (coal tar), power generation, production of coal tar, coke and asphalt, petroleum cracking and industrial and municipal incineration. Other sources include various crude oils, fresh and used motor oils, gasolines, charcoal-broiled foods, processed foods, various oils, margarine, butter and fats, fruits, vegetables, and cereals, roasted coffee and tea. Indoor sources include unvented kerosene heaters and gas cooking and heating appliances. Naphthalene is released during its manufacture and processes that involve its use (e.g., vaporization from moth balls).

Although PAHs generally occur in mixtures, certain chemicals tend to predominate in different sources so that the PAH pattern observed in a given medium may provide a clue to the source. The following compilation relates individual PAHs and sources:

Source[a]	Individual PAHs
Residential wood burning	Acenaphthylene
Auto emissions	Benzo(g,h,i)perylene, pyrene
Diesel exhaust particulates	Fluoranthene, phenanthrene, pyrene
Diesel exhaust vapors	Phenanthrene, anthracene

Source[a]	Individual PAHs
Diesel total emissions	Acenaphthene, fluorene, phenanthrene
Fly ash & bottom ash from U.S. municipal waste incinerators	Phenanthrene
Fly ash from U.K. municipal waste incinerators	Benzo(g,h,i)perylene
Particulate emissions from municipal waste incinerator	Benzo(a)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene
Municipal/medical waste incinerator	Benzo(a)anthracene, benzo(g,h,i)perylene
Rotary kiln incinerator charged with polyethylene, no afterburner	Fluoranthene, phenanthrene, pyrene (see next entry)
Rotary kiln incinerator charged with polyethylene with afterburner	Benzo(a)anthracene, phenanthrene (total PAH emissions reduced 100-fold compared with no afterburner)
Coal tar pitch emissions	Phenanthrene and pyrene 20 to 80 X > benzo(a)pyrene, benzo(g,h,i)perylene
Natural gas home appliances – fine particulate emissions	Chrysene, fluoranthene, pyrene, triphenylene
Groundwater near coal & oil gasification plant	Acenaphthylene, acenaphthene, fluorene, phenanthrene, fluoranthene, pyrene, chrysene
Groundwater near wood treatment facilities	Benzo(a)pyrene, phenanthrene
[a]Agency for Toxic Substances and Disease Registry, (ATSDR), 1995, ***Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs)***, U.S. Public Health Service, Atlanta, Georgia, August.	

Data compiled for soils are not included in the table above because the lists are long and the variation from one site to another is great, so that the information is not useful for identifying sources. Similarly, sediment is a sink for PAHs from all sources including atmospheric deposition from far distant locations, and the patterns observed in sediment do not necessarily reflect a nearby source (ATSDR, 1995). Generally, PAHs associated with combustion exhibit highly condensed ring structures and little alkylation (i.e., benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, benzo(e)pyrene, chrysene, fluoranthene, pyrene).

Crude petroleum and products made from crude petroleum (e.g., asphalts, fuels, oils) contain PAHs, but the patterns observed depend on the location of the source (ATSDR, 1995; Potter and Simmons, 1998). Phenanthrene and alkylated forms of PAHs, particularly the methylnaphthalenes, often predominate in petroleum products.

The partitioning and fate of the PAHs in environmental media depend largely on VP (tendency to exist in air as a vapor), H (indicator of partitioning between air and water) and K_{oc} (indicator of affinity to bind to organic matter in soil and sediment). ATSDR (1995) noted that H and K_{oc} are roughly directly related to MW, and that VP is roughly inversely related to MW. Therefore, they grouped the PAHs into the following categories to facilitate understanding their behavior in the environment:

- Low MW (152 to 178 g/mole) – acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene

- Medium MW (approximately 202 g/mole) – fluoranthene, pyrene

- High MW (228 to 278 g/mole) – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.

PAHs exist in the atmosphere as vapors or adsorbed to particulates, the proportion depending on the vapor pressure of the individual chemical and atmospheric conditions such as temperature and humidity (ATSDR, 1995; HSDB, 2013). Generally, the two- and three-ring compounds (low and medium MW except pyrene) exist predominantly as vapors; the four-ring compounds exist in both the vapor and particulate phase, and compounds with 5 or more rings (benzo[a]pyrene, benzo[g,h,i]perylene exist predominantly as particulates. Increasing atmospheric temperature and relative humidity favors existence in the vapor phase. PAHs may travel short or long distances before removal from the air. Vapor forms are subject to chemical oxidation processes in the air, which reduces the distance they may travel. Residence time and transport distance is inversely related to the size of the particles on which the PAHs are adsorbed. Small particles may have residence times of weeks, permitting transport for hundreds or upwards of a thousand miles. Wet and dry deposition accounts for removal of the particulates.

The predominant sources of PAHs in surface water are deposition from the atmosphere, industrial and sewage effluent and oil spills (ATSDR, 1995; 2005). Runoff and erosion can also contribute PAHs to surface water bodies. Volatilization is a significant fate process for PAHs with H values of 1E-5 atm-m^3/mole or greater (generally the low and medium MW compounds). Volatilization is a very limited removal process for most of the high MW compounds. Volatilization is enhanced by high temperature, turbulence and high wind. Sorption to benthic or suspended sediment and biodegradation are competing removal processes. Generally, volatilization and biodegradation are the predominant removal processes for the low MW compounds, and volatilization and sorption are the predominant removal processes for medium and high MW compounds. Naphthalene is relatively water soluble and may remain largely in solution. PAHs in sediment may biodegrade, recycle back to the water column (lower MW compounds) or accumulate in the lower trophic levels of living organisms.

Deposition from the atmosphere is the principal source of PAHs in soil (ATSDR, 1995; 2005). Other sources include industrial activities, disposal of sewage sludge, and leaching from coal storage sites. Most PAHs sorb to soil constituents because of their low solubility and high affinity for organic matter. Volatilization is an important removal process for the low molecular weight compounds. Some of the low molecular weight compounds, particularly naphthalene, may leach fairly rapidly to groundwater.

The high lipophilicity of many PAHs evidenced by high log K_{ow} values suggest that the PAHs might cross biologic membranes and participate significantly in food-chain pathways involving fish, fruit and vegetable, and meat and milk consumption. This, however, is not the case. For example, the PAHs are efficiently metabolized and excreted by fin fish, greatly reducing the likelihood of bioconcentration from water or bioaccumulation from sediment (ATSDR, 1995). Consequently, there are often great discrepancies between modeled BCF values and empirical BCF values, where care was taken to identify the parent compound rather than PAH metabolites in fish tissue. This distinction is necessary because aromatic fragments from PAH metabolism are readily assimilated as normal endogenous components of biological tissue. PAH concentrations in aquatic food-chain systems usually decrease with increasing trophic level, reflecting the generally greater efficiency of metabolism in the higher trophic organisms.

Approximate tissue-to-sediment PAH concentration ratios were reported to be 0.6 to 1.2 for amphipods, 0.1 for clams, and 0.05 for fin fish and shrimp.

It has been reported that terrestrial plants can accumulate PAHs from soil by uptake through the roots (ATSDR, 1995). More careful investigation, however, reveals that root uptake is quite low, and there is no evidence of bioconcentration or biomagnification. For example, PAH ratios in vegetation to soil in one survey ranged from 0.001 to 0.18 for total PAHs, and from 0.002 to 0.33 for benzo(a)pyrene. It is likely that most of the PAH contamination on the vegetation resulted from atmospheric deposition. Increased concentrations in vegetation have not been observed when soil PAH concentrations were greatly increased by amendment with sewage sludge. Data from carrots (*Daucus carotu*) showed that PAHs adhere to the outer skin of the root but show little tendency to penetrate to deeper layers, and even less tendency to translocate to aerial parts.

The inability of plants to bioconcentrate PAHs from soil reduces concern for bioconcentration in agricultural products such as meat and milk. It should be noted, however, that measurable concentrations of PAHs may accumulate on the aerial parts of plants because of deposition from the atmosphere (ATSDR, 1995). Also, food-producing animals ingest a substantial amount of soil while grazing or consuming mechanically harvested forage crops. Mammals, however, efficiently metabolize the PAHs to polar compounds that are readily excreted, reducing concern for bioconcentration.

In summary, the PAHs are highly lipophilic, which implies significance in food-chain exposure pathways. Empirical data, however, show that fish and mammals efficiently metabolize and eliminate these compounds. Furthermore, bioconcentration in plants because of uptake from soil is not significant. Therefore, it is unlikely that the PAHs would participate significantly in food-chain pathways, and biotransfer factors are not estimated.

3.0 Toxicokinetics

The PAHs are absorbed by all routes of exposure, but the rate and extent depends on the compound, the species of animal and the vehicle (or nature of the particulates) (ATSDR, 1995). PAHs are readily absorbed during inhalation exposure; however, intratracheal instillation studies indicate that particle size is the most important determiner of the extent of pulmonary uptake.

Toxicokinetic studies of several PAHs summarized by ATSDR (1995) provide limited quantitative information regarding the extent of GI absorption. Limitations arise largely because biliary excretion complicates quantification of uptake from the GI tract. A study of benzo(a)pyrene in rats suggests that GI absorption ranges from 38 to 58 percent. A study in rats reported absorption efficiency for anthracene ranging from 53 to 74 percent. GI absorption of pyrene, chrysene and dibenzo(a,h)anthracene is described as high. Administration of the test compound in oil or in a high-fat diet appears to increase the extent of GI absorption.

Empirical data with pure compound dissolved or suspended in various vehicles suggest that dermal uptake of benzo(a)pyrene is extensive (ATSDR, 1995). One occupational study reported that approximately 75 percent of systemically absorbed pyrene entered the body through dermal uptake rather than through inhalation exposure. Combining PAHs with soil appears to significantly reduce the extent of dermal uptake compared with oleaginous or acetone vehicles.

Anecdotal evidence from using cloth diapers stored in contact with naphthalene indicates that naphthalene is absorbed by the skin, but quantitative data are not available (ATSDR, 2005).

Distribution of absorbed PAHs is generally widespread, with highest levels located initially in lipid-rich tissues (ATSDR, 1995). Highest levels of metabolites (radioactivity following administration of radiolabeled compounds) are located in the liver and GI tract, even after inhalation exposure, probably reflecting extensive metabolism in the liver followed by biliary excretion. Ciliary clearance and deglutition probably contribute to levels associated with the GI tract. Concentrations of radioactivity following administration of radiolabeled compound reveal fetal levels approximately 2- to 10-fold lower than maternal levels, although this depends on the specific compound administered.

Metabolism of the PAHs, particularly benzo(a)pyrene, has been extensively studied (ATSDR, 1995). Metabolism proceeds rapidly, yielding products that are more water soluble and readily excreted than the parent compound. All tissues have the ability to metabolize the PAHs, potentially to carcinogenic intermediates, which probably accounts for the observation that cancers occur at the point of contact. There is considerable variability in tissue metabolic activity; however, the liver is probably the most active in most cases.

ATSDR (1995) distinguishes between “alternant” and “nonalternant” PAHs, based on the nature of the electron density associated with the molecule, which influences how that compound is metabolized to its ultimate carcinogen. Alternant PAHs (e.g., benzo[a]pyrene, benzo[a]anthracene, chrysene, dibenz[a,h]anthracene) exhibit a uniformly distributed electron density. Nonalternant PAHs (e.g., fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-cd]pyrene) behave more like two separate molecules because of uneven electron distribution.

Alternant PAHs (based on data for benzo[a]pyrene) are initially metabolized by the microsomal cytochrome P-450 system to several arene oxides (ATSDR, 1995). These may re-arrange spontaneously to phenols or undergo hydration to form the corresponding trans-dihydrodiols. Further oxidation of the dihydrodiols results in formation of quinones, phenol diols and dihydrodiol epoxides. Phenols may be formed by direct insertion of oxygen into a ring. Many of the metabolites resulting from the reactions described above are subject to conjugation with various substrates followed rapidly by excretion. The dihydrodiol epoxides that form in the “bay” region (the three-sided concave region formed by the fusion of three benzene rings) are most likely the ultimate carcinogens that covalently bind to macromolecules such as DNA, resulting in alkylation or other adducts that yield genetic errors.

Metabolism of the nonalternant PAHs differs from the alternant PAHs in that more extensive oxidation to hydroxy-epoxy-diols may be important to achieve genotoxicity (ATSDR, 1995). Dihydrodiol epoxide formation in the bay region is associated with carcinogenicity of the PAHs generally; however, some of the nonalternant PAHs yield reactive metabolites that deviate from the classical bay region model.

PAH metabolites are readily excreted, largely through the bile, although some metabolites are excreted by the kidney (ATSDR, 1995). The extent of elimination is species specific. In one inhalation study rats excreted metabolites much more efficiently than dogs or monkeys.

4.0 Dermal Exposure

EPA (2004) recommends that oral toxicity values for the PAHs should not be adjusted when applied to dermal exposure because GI absorption probably exceeds 50 percent. Therefore, no GAF is estimated and the oral toxicity values described below should be used for dermal exposure without adjustment.

Empirical data with pure compound dissolved or suspended in various vehicles suggest that dermal uptake of benzo(a)pyrene is extensive (ATSDR, 1995). Anecdotal evidence from using cloth diapers stored in contact with naphthalene indicates that naphthalene is absorbed by the skin, but quantitative data are not available (ATSDR, 2005). EPA (2004) reviewed empirical data regarding dermal uptake of benzo(a)pyrene and recommended an ABS of 0.13 for the PAHs. However, EPA (2004) also notes that VOCs tend to volatilize from soil when applied to the skin, reducing dermal uptake to toxicologically insignificant levels. Therefore, the ABS of 0.13 is applied to all the PAHs identified above as SVOCs. Dermal uptake of the PAHs identified as VOCs is not quantified.

Values for t*, K_p, τ, FA and B are provided or estimated as follows:

Chemical	t*	K_p	τ	FA	B
Acenaphthene[a]	1.84	8.39E-2	7.67E-1	1	0.4
Acenaphthylene[a]	1.79	1.08E-1	7.47E-1	1	0.5
Anthracene[a]	4.06	1.38E-1	1.05E+0	1	0.7
Benzo(a)anthracene[b]	8.53	4.7E-1	2.03E+0	1.0	2.8
Benzo(a)pyrene[b]	11.67	7.0E-1	2.69E+0	1.0	4.3
Benzo(b)fluoranthene[b]	12.03	7.0E-1	2.77E+0	1.0	4.3
Benzo(k)fluoranthene[a]	12.40	2.00E+0	2.72E+0	0.4	12
Benzo(g,h,i)perylene[a]	8.89	1.07E+0	3.70E+0	0.7	6.8
Chrysene[b]	8.53	4.7E-1	2.03E+0	1.0	2.8
Dibenz(a,h)anthracene[b]	17.57	1.5E+0	3.88E+0	0.6	9.7
Fluoranthene[b]	5.68	2.2E-1	1.45E+0	1.0	1.2
Fluorene[a]	2.15	1.07E-1	8.95E-1	1	0.5
Indeno(1,2,3-cd)pyrene[b]	16.83	1.0E+0	3.78E+0	0.6	6.7
Naphthalene[b]	1.34	4.7E-2	5.6E-1	1	0.2
Phenanthrene[b]	4.11	1.4E-1	1.06E+0	1	0.7
Pyrene[a]	3.42	1.94E-1	1.43E+0	1	1.1

t* = time for dermal uptake to reach steady state (hours); K_p = permeability coefficient (cm/hour); τ = lag time for chemical to cross stratum corneum (hours); FA = fraction absorbed (unitless); B = ratio of the permeability coefficient for passage across the stratum corneum relative to the permeability coefficient for passage across the viable epidermis (unitless).
[a]Estimated as described in Introduction to Toxicological profiles.
[b]Provided by U.S. Environmental Protection Agency (EPA), 2004, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

5.0 Noncancer Effects Evaluation

The PAHs are generally divided into two EPA cancer weight-of-evidence groups: Group D – not classifiable as to carcinogenicity to humans, and Group B2 – probable human carcinogens. The Group D PAHs have not been evaluated for carcinogenicity by toxicity testing; therefore, cancer SFs or URFs cannot be estimated for these compounds (EPA, 1986, 2010). Risk evaluation of these compounds is limited to noncancer effects. It is theoretically possible that cancer risk could be the "driver" for some of these compounds. However, the mechanism of carcinogenicity of the PAHs is fairly well understood to be correlated with molecular morphology and the propensity to

form certain active metabolites (ATSDR, 1995). The Group D PAHs either do not fit the morphologic mold or have been shown empirically to be unlikely to cause cancer, reducing greatly the uncertainty that significant cancer risk is being overlooked.

Cancer SFs and URFs are available for the Group B2 compounds, but noncancer RfDs or RfCs are not. Therefore, risk evaluation of these compounds is limited to cancer risk. These compounds have the morphologic requirements for carcinogenicity; therefore, it has been thought that cancer risk is the driver, and that noncancer effects are relatively insignificant, although empirical data were lacking until recently.

Recent data support this assumption. De Jong et al. (2008) reported a study in which male rats were treated by gavage with benzo(a)pyrene 5 days per week for 35 days at dose rates of 0 (control), 3, 10, 30 or 90 mg/kg. Significantly reduced rate of body weight gain and altered organ weights were observed in the 90 mg/kg group. Fore stomach lesions were found in the 30 and 90 mg/kg groups. Decreased thymus weights and hematological evidence of erythrocyte toxicity were observed in a dose-related manner in rats treated with 10 mg/kg and above. Subtle alterations in measures of immune function were also observed in these groups, establishing 10 mg/kg as the LOAEL and 3 mg/kg as the NOAEL for this study. The 3 mg/kg dose is equivalent to a NOAEL of 2.1 mg/kg-day when adjusted for continuous exposure. Application of an uncertainty factor of 1000 (factor of 10 to expand from subchronic to chronic exposure, and factors of 10 each to provide additional protection for intra- and interspecies variation) allows development of a preliminary oral RfD of 2E-3 mg/kg-day. Uncertainty surrounding the preliminary oral RfD is very high because the data base for the noncancer effects of benzo(a)pyrene is essentially limited to one study and several toxicological endpoints (e.g., developmental, reproductive, neurological) were not investigated.

The sole purpose for developing this oral RfD is to evaluate the potential for noncancer effects to be the driver for the Group B2 PAHs. The RfD was not developed with sufficient rigor to be used in the risk assessment of the noncancer effects of benzo(a)pyrene. The oral SF for benzo(a)pyrene is 7.3 per mg/kg-day (please see below), from which it is estimated that the oral RfD is equivalent to a cancer risk of 1.5E-2. This cancer risk is orders of magnitude above the EPA (1990) risk management range of 1E-6 to 1E-4, strengthening the position that noncancer effects are unlikely to be the driver for the Group B2 PAHs.

Data regarding the toxicity of acute oral exposure to the PAHs are generally scarce. Prolonged oral exposure to the Group D PAHs is associated with a number of renal, hematologic and other effects, depending on the compound.

Subchronic (90 day) gavage treatment of mice with acenaphthene is associated with histopathologic evidence of liver hypertrophy. A verified RfD of 6E-2 mg/kg-day for chronic oral exposure was derived from the NOAEL of 175 mg/kg-day and an uncertainty factor of 3000 (EPA, 2010). The LOAEL in this study was 350 mg/kg-day. Confidence in the RfD is low. The liver is considered the target organ for prolonged oral exposure to acenaphthene. EPA (1997) derived a provisional subchronic oral RfD for acenaphthene of 6E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

A verified RfD of 3E-1 mg/kg-day for chronic oral exposure to anthracene was derived from a NOEL of 1000 mg/kg-day, the highest dose tested, in a 90-day gavage study in mice (EPA,

2010). An uncertainty factor of 3000 was applied. Confidence in the RfD is low. The data are inadequate to identify a target organ for prolonged oral exposure to anthracene. EPA (1997) derived a provisional subchronic oral RfD for anthracene of 3E+0 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Subchronic exposure to fluoranthene induces liver and kidney effects and hematologic alterations in orally treated mice (EPA, 2010). A verified RfD of 4E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 125 mg/kg-day in a 13-week gavage study. The LOAEL was 250 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The kidney, liver and blood cells are chosen as the target organs for prolonged oral exposure to fluoranthene. EPA (1997) derived a provisional subchronic oral RfD for fluoranthene of 4E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Subchronic exposure to fluorene induces hemolytic anemia in orally treated mice (EPA, 2010). A verified RfD of 4E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 125 mg/kg-day in a 13-week gavage study. The LOAEL was 250 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The erythrocyte is the target organ for prolonged oral exposure to fluorene. EPA (1997) derived a provisional subchronic oral RfD for fluorene of 4E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Single-dose LD_{50} values for naphthalene include 533 to 710 mg/kg for mice and 2200 to 2400 mg/kg for rats, establishing the mouse as more sensitive to the lethal effects of acute oral exposure (ATSDR, 2005). Decreased terminal body weights, accompanied by a remarkable absence of hematological and histopathological effects, were observed in rats treated by gavage for 13 weeks (EPA, 2010). The LOAEL in this study was 142 mg/kg-day associated with greater than 10 percent reduction in terminal body weights. The NOAEL was 71 mg/kg-day. The high dose rate, 286 mg/kg-day was a FEL associated with increased mortality. Application of an uncertainty factor of 3000 (10 to extrapolate from rats to humans, 10 to protect sensitive humans, 10 to extrapolate from subchronic to chronic exposure, and 3 for database deficiencies) to the NOAEL of 71 mg/kg-day yields the verified chronic oral RfD of 2E-2 mg/kg-day. Confidence in the RfD is low. A preliminary subchronic oral RfD can be derived for naphthalene by applying an uncertainty factor of 300 to the NOAEL of 71 mg/kg-day described above. The uncertainty factor of 300 reflects the chronic uncertainty factor of 3000 without the factor of 10 to expand from subchronic to chronic exposure. The preliminary subchronic oral RfD so derived is 2E-1 mg/kg-day.

The key study described above is not sufficient to identify target organs for prolonged oral exposure to naphthalene. Adults, children and neonates exposed to moth balls exhibit hemolytic anemia, evidence of liver disease and neurological deficits (EPA, 1993a, 1998). The liver effects and neurological deficits may be secondary to hemolytic anemia and reduced oxygen-carrying capacity of the blood. Hemolytic anemia and cataract formation have been seen also in orally exposed humans (EPA, 1998). The data suggest that the erythrocyte may be the most sensitive tissue in humans. Among common species of laboratory mammals, hemolytic anemia is seen only in dogs (EPA, 1998). Cataracts are seen in several laboratory mammals, but only at relatively high doses. The key study identifies reduced body weight as the critical effect in rats. Rats, however, do not exhibit hemolytic anemia, and exhibit cataracts only at very high doses,

suggesting that rats may not be a totally acceptable model for the toxicity of naphthalene to humans. Therefore, based on the effects observed in humans, the erythrocyte and eye are selected as target organs for prolonged oral exposure to naphthalene. Reduced body weight is also included as a critical effect because this was the only endpoint observed in rats in the key study.

EPA (1993a, 2010) reported a 2-year study in which mice were exposed to naphthalene vapors for 6 hours/day on 5 days/week. Inflammation of the nasal and olfactory epithelium was the most consistently observed sign; granulomatous lesions in the lungs were also observed. There was equivocal evidence of hematologic involvement. The lowest exposure concentration, 10 ppm, was a LOAEL for the nasal effects, which are considered the critical effects of inhalation exposure. The LOAEL is equivalent to a human equivalent concentration of 9.3 mg/m^3 (EPA, 2010). Application of an uncertainty factor of 3000 yields a verified chronic inhalation RfC of 3E-3 mg/m^3, which is equivalent to a chronic inhalation RfD of 8.6E-4 mg/kg-day. The nasal and olfactory epithelia are the target organs for inhalation exposure to naphthalene. Confidence in the RfC is medium. The chronic inhalation RfC of 3E-3 mg/m^3, equivalent to an inhalation RfD of 8.6E-4 mg/kg-day, is adopted as sufficiently protective for subchronic inhalation exposure as well.

Subchronic exposure to pyrene induces mild renal tubular degeneration and reduced kidney weight in orally treated mice (EPA, 2010). A verified RfD of 3E-2 mg/kg-day for chronic oral exposure was derived from a NOAEL of 75 mg/kg-day in a 13-week gavage study. The LOAEL was 125 mg/kg-day in this study. An uncertainty factor of 3000 was applied. Confidence in the oral RfD is low. The kidney tubule is chosen as the target organ for chronic oral exposure to pyrene. EPA (1997) derived a provisional subchronic oral RfD for pyrene of 3E-1 mg/kg-day from the same mouse study using an uncertainty factor of 300.

Data regarding prolonged oral exposure are not available for several of the Group D PAHs, which hinders estimation of an RfD or RfC and compromises evaluation of the potential for noncancer effects. Therefore, surrogates are used to develop toxicity values for the noncancer effects.

Generally surrogates are chosen on the basis of the following hierarchy:

- Toxicological similarity (effects and dose-response relationship).
- Toxicokinetic similarity, assuming that likeness in absorption, distribution and especially products of biotransformation suggests toxicological similarity.
- Structural similarity, assuming that likeness in structure suggests similarity in toxicokinetics.

Selection of defensible surrogates for the PAHs is compromised because toxicological and toxicokinetic data are virtually non-existent (except for benzo[a]pyrene), and the structural similarities often are not very convincing, which imparts a great deal of uncertainty to the effort. Therefore, the most defensible approach for some of the PAHs is to select the most conservative surrogate; i.e., the PAH with the smallest verified oral RfD, which happens to be pyrene.

Data regarding the effects of chronic or subchronic exposure to acenaphthylene were not located in the available literature. Acenaphthene is adopted as a reasonable surrogate for acenaphthylene based on structural similarity, since the surrogate differs from the principal chemical only in the presence of two hydrogen atoms and the absence of a double bond. Therefore, the verified chronic oral RfD of 6E-2 mg/kg-day for acenaphthene is adopted as the RfD for chronic oral exposure to acenaphthylene. The liver, which is the target organ for acenaphthene, is adopted for oral exposure to acenaphthylene. Similarly, the provisional subchronic oral RfD of 6E-1 mg/kg-day for acenaphthene is adopted as the RfD for subchronic oral exposure to acenaphthylene.

Data regarding the effects of chronic or subchronic exposure to benzo(g,h,i)perylene were not located in the available literature. Pyrene is adopted as a reasonable surrogate for benzo(g,h,i)perylene based somewhat on structural similarity, but more on the selection of a conservative approach as justified above. Therefore, the verified oral RfD of 3E-2 mg/kg-day for pyrene is adopted as the oral RfD for chronic exposure to benzo(g,h,i)perylene. Similarly, the provisional subchronic oral RfD of 3E-1 mg/kg-day for pyrene is adopted as the RfD for subchronic oral exposure to benzo(g,h,i)perylene. The kidney tubule, which is the target organ for pyrene, is adopted for oral exposure to benzo(g,h,i)perylene.

Relevant data regarding chronic or subchronic exposure to phenanthrene were not located. Potential surrogates based on similarity in chemical structure include anthracene and pyrene. Pyrene is selected as the surrogate only because it is the more conservative choice. Therefore, the verified oral RfD of 3E-2 mg/kg-day for pyrene is adopted as the oral RfD for chronic exposure to phenanthrene. Similarly, the provisional subchronic oral RfD of 3E-1 mg/kg-day for pyrene is adopted as the RfD for subchronic oral exposure to phenanthrene. The kidney tubule, which is the target organ for pyrene, is adopted for oral exposure to phenanthrene.

Data regarding inhalation exposure sufficient for development of inhalation RfCs were not located for any of the PAHs with the exception of naphthalene as noted above.

6.0 Carcinogenicity Evaluation

Acenaphthylene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, phenanthrene and pyrene are classified in EPA cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) because of a lack of human data and inadequate animal data (EPA, 2013). Data regarding the carcinogenicity of acenaphthene were not located. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, , chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene are classified in EPA weight-of-evidence Group B2 (probable human carcinogens) (EPA, 1997, 2013). Benzo(a)pyrene is the most extensively studied member of the class, inducing tumors in tissues at the point of contact of practically all laboratory species tested by all routes of exposure.

Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans, the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures (ATSDR, 1995). In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke and coke oven emissions accounted for only 0.1-8% of the total mutagenic activity in *Salmonella* of the unfractionated complex mixture (Lewtas, 1988). Aromatic amines, nitrogen heterocyclic compounds, highly oxygenated quinones, diones,

and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounts for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Furthermore, coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans (ATSDR, 1995).

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups is based largely on the results of animal studies with large doses of purified compound (EPA, 2013). Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Although the carcinogenicity of benzo(a)pyrene in animals managed in an unnatural manner in laboratory conditions has been well established, the potential for carcinogenicity to humans in environmental settings involving exposure to low concentrations remains unclear.

EPA (2013) verified a SF for oral exposure to benzo(a)pyrene of 7.3E+0 per mg/kg-day, based on several dietary studies in mice and rats. Recent reevaluations of the carcinogenicity and mutagenicity of the Group B2 PAHs suggest that there are large differences between individual PAHs in cancer potency (Krewski et al., 1989). Based on the available cancer and mutagenicity data, and assuming that there is a constant relative potency between different potential carcinogens across different bioassay systems and that the PAHs under consideration have similar dose-response curves, EPA (1993b) adopted relative potency values for several PAHs. These values and the corresponding oral SFs, based on a relative potency for benzo(a)pyrene of 1.0, are presented below:

Relative Potency Estimates for PAHs				
			Inhalation	
PAH	Relative Potency	Oral Slope Factor (per mg/kg-day)	Unit Risk Factor (per µg/m^3)	Slope Factor (per mg/kg-day)
Benzo(a)pyrene	1.0	7.3E+0	8.8E-4	3.1E+0
Benzo(a)anthracene	0.1	7.3E-1	8.8E-5	3.1E-1
Benzo(b)fluoranthene	0.1	7.3E-1	8.8E-5	3.1E-1
Benzo(k)fluoranthene	0.01	7.3E-2	8.8E-6	3.1E-2
Chrysene	0.001	7.3E-3	8.8E-7	3.1E-3
Dibenz(a,h)anthracene	1.0	7.3E+0	8.8E-4	3.1E+0
Indeno(1,2,3-cd)pyrene	0.1	7.3E-1	8.8E-5	3.1E-1

Although the EPA has not verified SFs for Group B2 PAHs other than benzo(a)pyrene, the SFs above represent reasonable estimates based on the data available. The relative potency approach employed here meets criteria considered to be desirable for this type of analysis (Lewtas, 1988). For example, the chemicals compared have similar chemical structures and would be expected to have similar toxicokinetic fate in mammalian systems. In addition, the available data suggest that the Group B2 PAHs have a similar mechanism of action, inducing frameshift mutations in *Salmonella* and tumor initiation in the mouse skin painting assay. Similar noncancer effects (minor changes in the blood, liver, kidneys) of the Group D PAHs support the hypothesis of a common mechanism of toxicity. Finally, the same endpoints of toxicity, i.e., potency in various cancer assays, and related data, were used to derive the relative potency values (Krewski et al., 1989). The oral SF for benzo(a)pyrene of 7.3E+0 per mg/kg-day, and the SFs presented above for the other Group B2 PAHs are adopted for the purposes of this evaluation.

An EPA (1994) evaluation of the inhalation cancer data suggests adoption of an inhalation SF for benzo(a)pyrene of 3.1E+0 per mg/kg-day, based on the incidence of upper respiratory and digestive tract tumors in hamsters. Applying the relative potency estimates presented above yield the inhalation URFs and SFs for the other Group B2 PAHs presented above.

EPA (2013) classified naphthalene in EPA cancer weight-of-evidence group C – possible human carcinogen – based on benign respiratory tumors and one carcinoma in female mice exposed to naphthalene by inhalation. Cancer potency factors are not available because the data are not sufficient.

7.0 Toxicity Summary

Toxicity values for the PAHs are summarized below:

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi
Acenaphthene										
6E-1	6E-2	L	ND	ND	NA	ND	NA	ND	NA	NA
Acenaphthylene										
6E-1	6E-2	L	ND	ND	NA	D	NA	D	NA	NA
Anthracene										
3E+0	3E-1	ND	ND	ND	NA	D	NA	D	NA	NA
Benzo(a)anthracene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Benzo(a)pyrene										
ND	ND	NA	ND	ND	NA	B2	7.3E+0	B2	8.8E-4	3.1E+0
Benzo(b)fluoranthene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Benzo(k)fluoranthene										
ND	ND	NA	ND	ND	NA	B2	7.3E-2	B2	8.8E-6	3.1E-2
Benzo(g,h,i)perylene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA
Chrysene										
ND	ND	NA	ND	ND	NA	B2	7.3E-3	B2	8.8E-7	3.1E-3
Dibenz(a,h)anthracene										
ND	ND	NA	ND	ND	NA	B2	7.3E+0	B2	8.8E-4	3.1E+0
Fluoranthene										
4E-1	4E-2	L,K,B	ND	ND	NA	D	NA	D	NA	NA
Fluorene										
4E-1	4E-2	E	ND	ND	NA	D	NA	D	NA	NA
Indeno(1,2,3-cd)pyrene										
ND	ND	NA	ND	ND	NA	B2	7.3E-1	B2	8.8E-5	3.1E-1
Naphthalene										
2E-1	2E-2	E, Ey, BW	3E-3/ 8.6E-4	3E-3/ 8.6E-4	Ne, Oe	C	ND	C	ND	ND
Phenanthrene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA
Pyrene										
3E-1	3E-2	K	ND	ND	NA	D	NA	D	NA	NA

Noncancer Effects						Carcinogenicity				
Oral Exposure[a]			Inhalation Exposure			Oral Exposure[a]		Inhalation Exposure		
sRfDo	cRfDo	TO	sRfC/ sRfDi	cRfC/ cRfDi	TO	WOE	SFo	WOE	URFi	SFi

sRfDo = subchronic oral reference dose (milligrams per kilogram-day); cRfDo = chronic oral reference dose (milligrams per kilogram-day); TO = target organ(s) or critical effect(s); sRfC = subchronic inhalation reference concentration (milligrams per cubic meter); sRfDi = subchronic inhalation reference dose (milligrams per kilogram-day); cRfC = chronic inhalation reference concentration (milligrams per cubic meter); cRfDi = chronic inhalation reference dose (milligrams per kilogram-day); WOE = cancer weight-of-evidence evaluation; SFo = oral cancer slope factor (risk per milligram per kilogram-day); URFi = inhalation unit risk factor (risk per microgram per cubic meter); SFi = inhalation cancer slope factor (risk per milligram per kilogram-day); ND = no data; NA = not applicable.
Target organ or critical effect abbreviations: B = blood cells; BW = reduced body weight; E = erythrocyte; Ey = eye; L = liver; K = kidney; Ne = nasal epithelium; Oe = olfactory epithelium.
[a]sRfDo, cRfDo and SFo should be used for dermal exposure without adjustment for GI absorption.

8.0 References

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APPENDIX D

RISK CHARACTERIZATION SPREADSHEETS

Table D-1

Groundskeeper, Current Scenario, Exposure to Surface Soil
Ash Pit No. 3
Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Arsenic	2.88E+01	1.01E-05	2.82E-05	1.51E-05	9.40E-02	1.73E-07	1.99E-06	5.58E-06	2.99E-06	1.86E-02
Thallium	2.69E+00	9.38E-07	2.63E-06	NA	4.04E-02	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	5.45E-08	1.53E-07	3.98E-08	NA	4.06E-09	4.68E-08	1.31E-07	3.41E-08	NA
Benzo(a)pyrene	1.68E-01	5.87E-08	1.64E-07	4.29E-07	NA	4.37E-09	5.04E-08	1.41E-07	3.68E-07	NA
Benzo(b)fluoranthene	2.38E-01	8.32E-08	2.33E-07	6.07E-08	NA	6.19E-09	7.14E-08	2.00E-07	5.21E-08	NA
Total ILCR or HI				**1.56E-05**	**1.34E-01**				**3.44E-06**	**1.86E-02**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/m^3 - Milligrams per cubic meter.

Table D-1

Groundskeeper, Current Scenario, Exposure to Surface Soil
Ash Pit No. 3
Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Arsenic	2.88E-06	2.01E-07	5.64E-07	3.02E-06	NA	**2.11E-05**	**1.13E-01**
Thallium	2.69E-07	1.88E-08	5.25E-08	NA	NA	**NA**	**4.04E-02**
Semivolatile Organic Compounds							
Benzo(a)anthracene	1.56E-08	1.09E-09	3.05E-09	3.38E-10	NA	**7.43E-08**	**NA**
Benzo(a)pyrene	1.68E-08	1.17E-09	3.29E-09	3.64E-09	NA	**8.00E-07**	**NA**
Benzo(b)fluoranthene	2.38E-08	1.66E-09	4.66E-09	5.16E-10	NA	**1.13E-07**	**NA**
Total ILCR or HI				**3.02E-06**	**NA**	**2.21E-05**	**1.53E-01**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/m^3 - Milligrams per cubic meter.

Table D-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Arsenic	2.28E+01	7.95E-06	2.23E-05	1.19E-05	7.42E-02	1.37E-07	1.57E-06	4.41E-06	2.36E-06	1.47E-02
Thallium	1.47E+00	5.15E-07	1.44E-06	NA	2.22E-02	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	5.45E-08	1.53E-07	3.98E-08	NA	4.06E-09	4.68E-08	1.31E-07	3.41E-08	NA
Benzo(a)pyrene	1.68E-01	5.87E-08	1.64E-07	4.29E-07	NA	4.37E-09	5.04E-08	1.41E-07	3.68E-07	NA
Benzo(b)fluoranthene	1.91E-01	6.67E-08	1.87E-07	4.87E-08	NA	4.97E-09	5.73E-08	1.60E-07	4.18E-08	NA
Total ILCR or HI				**1.24E-05**	**9.64E-02**				**2.81E-06**	**1.47E-02**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/m^3 - Milligrams per cubic meter.

Table D-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Arsenic	2.28E-06	1.59E-07	4.45E-07	2.39E-06	NA	**1.67E-05**	**8.89E-02**
Thallium	1.47E-07	1.03E-08	2.88E-08	NA	NA	**NA**	**2.22E-02**
Semivolatile Organic Compounds							
Benzo(a)anthracene	1.56E-08	1.09E-09	3.05E-09	3.38E-10	NA	**7.43E-08**	**NA**
Benzo(a)pyrene	1.68E-08	1.17E-09	3.29E-09	3.64E-09	NA	**8.00E-07**	**NA**
Benzo(b)fluoranthene	1.91E-08	1.33E-09	3.74E-09	4.14E-10	NA	**9.09E-08**	**NA**
Total ILCR or HI				**2.39E-06**	**NA**	**1.76E-05**	**1.11E-01**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/m^3 - Milligrams per cubic meter.

Table D-3

Groundskeeper, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
Chemicals of Potential Concern	EPC mg/L	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics												
Arsenic	8.02E-03	2.80E-05	7.85E-05	4.20E-05	2.62E-01	8.02E-09	9.25E-08	2.59E-07	1.39E-07	8.63E-04	**4.22E-05**	**2.62E-01**
Chromium, Total	1.30E-03	4.54E-06	1.27E-05	NA	6.06E-04	1.30E-09	1.50E-08	4.20E-08	NA	1.55E-04	**NA**	**7.61E-04**
Cobalt	1.75E-03	6.10E-06	1.71E-05	NA	5.69E-02	6.98E-10	8.05E-09	2.26E-08	NA	7.52E-05	**NA**	**5.70E-02**
Iron	1.35E+00	4.72E-03	1.32E-02	NA	1.89E-02	1.35E-06	1.56E-05	4.37E-05	NA	NA	**NA**	**1.89E-02**
Manganese	1.11E+00	3.86E-03	1.08E-02	NA	2.30E-01	1.11E-06	1.28E-05	3.57E-05	NA	1.88E-02	**NA**	**2.49E-01**
General Chemistry												
Sulfate	5.38E+02	1.88E+00	5.26E+00	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR or HI				**4.20E-05**	**5.68E-01**				**1.39E-07**	**1.99E-02**	**4.22E-05**	**5.88E-01**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/L - Milligrams per liter.
mg/cm^2 - Milligrams per square meter.
mg/kg - Milligrams per kilogram.

Table D-4

Indoor Worker, Future Scenario, Exposure to Surface Soil
Ash Pit No. 3
Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion					
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics							
Arsenic	2.88E+01	5.03E-06	1.41E-05	7.55E-06	4.70E-02	**7.55E-06**	**4.70E-02**
Thallium	2.69E+00	4.69E-07	1.31E-06	NA	2.02E-02	**NA**	**2.02E-02**
Semivolatile Organic Compounds							
Benzo(a)anthracene	1.56E-01	2.73E-08	7.63E-08	1.99E-08	NA	**1.99E-08**	**NA**
Benzo(a)pyrene	1.68E-01	2.94E-08	8.22E-08	2.14E-07	NA	**2.14E-07**	**NA**
Benzo(b)fluoranthene	2.38E-01	4.16E-08	1.16E-07	3.04E-08	NA	**3.04E-08**	**NA**
Total ILCR or HI						**7.82E-06**	**6.72E-02**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.

Table D-5

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Inorganics										
Arsenic	2.28E+01	5.25E-07	7.33E-05	7.87E-07	2.44E-01	2.05E-07	4.72E-08	6.60E-06	7.09E-08	2.20E-02
Thallium	1.47E+00	3.40E-08	4.75E-06	NA	7.30E-02	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	3.60E-09	5.02E-07	2.63E-09	NA	6.08E-09	1.40E-09	1.96E-07	1.02E-09	NA
Benzo(a)pyrene	1.68E-01	3.87E-09	5.41E-07	2.83E-08	NA	6.55E-09	1.51E-09	2.11E-07	1.10E-08	NA
Benzo(b)fluoranthene	1.91E-01	4.41E-09	6.15E-07	3.22E-09	NA	7.45E-09	1.72E-09	2.40E-07	1.25E-09	NA
Total ILCR or HI				**8.22E-07**	**3.17E-01**				**8.42E-08**	**2.20E-02**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-5

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Inorganics							
Arsenic	7.97E-06	1.11E-08	1.55E-06	1.67E-07	NA	**1.03E-06**	**2.66E-01**
Thallium	5.16E-07	7.21E-10	1.01E-07	NA	NA	**NA**	**7.30E-02**
Semivolatile Organic Compounds							
Benzo(a)anthracene	5.46E-08	7.63E-11	1.07E-08	2.37E-11	NA	**3.67E-09**	**NA**
Benzo(a)pyrene	5.88E-08	8.22E-11	1.15E-08	2.55E-10	NA	**3.96E-08**	**NA**
Benzo(b)fluoranthene	6.69E-08	9.34E-11	1.30E-08	2.90E-11	NA	**4.50E-09**	**NA**
Total ILCR or HI				**1.67E-07**	**NA**	**1.07E-06**	**3.39E-01**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table D-6

Indoor Worker, Future Scenario, Exposure to Overburden Monitoring Well Groundwater
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
Chemicals of Potential Concern	EPC mg/L	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics												
Arsenic	8.02E-03	2.80E-05	7.85E-05	4.20E-05	2.62E-01	8.02E-09	9.25E-08	2.59E-07	1.39E-07	8.63E-04	**4.22E-05**	**2.62E-01**
Chromium, Total	1.30E-03	4.54E-06	1.27E-05	NA	6.06E-04	1.30E-09	1.50E-08	4.20E-08	NA	1.55E-04	**NA**	**7.61E-04**
Cobalt	1.75E-03	6.10E-06	1.71E-05	NA	5.69E-02	6.98E-10	8.05E-09	2.26E-08	NA	7.52E-05	**NA**	**5.70E-02**
Iron	1.35E+00	4.72E-03	1.32E-02	NA	1.89E-02	1.35E-06	1.56E-05	4.37E-05	NA	NA	**NA**	**1.89E-02**
Manganese	1.11E+00	3.86E-03	1.08E-02	NA	2.30E-01	1.11E-06	1.28E-05	3.57E-05	NA	1.88E-02	**NA**	**2.49E-01**
General Chemistry												
Sulfate	5.38E+02	1.88E+00	5.26E+00	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR or HI				**4.20E-05**	**5.68E-01**				**1.39E-07**	**1.99E-02**	**4.22E-05**	**5.88E-01**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/L - Milligrams per liter.
mg/cm^2 - Milligrams per square meter.
mg/kg - Milligrams per kilogram.

Table D-7

Construction Worker, Current and Future Scenarios, Exposure to Sediment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact					All Pathways	
		Cancer	Noncancer			Dose	Cancer	Noncancer				
	EPC	Dose	Dose			Absorbed	Dose	Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Inorganics												
Arsenic	6.40E+00	1.48E-07	2.06E-05	2.21E-07	6.87E-02	5.76E-08	1.33E-08	1.85E-06	1.99E-08	6.18E-03	**2.41E-07**	**7.49E-02**
Chromium, total	1.08E+01	2.49E-07	3.48E-05	NA	1.66E-03	NA	NA	NA	NA	NA	**NA**	**1.66E-03**
Semivolatiles Organic Compounds												
Benzo(a)pyrene	1.58E-01	3.64E-09	5.09E-07	2.66E-08	NA	6.16E-09	1.42E-09	1.98E-07	1.04E-08	NA	**3.70E-08**	**NA**
Benzo(b)fluoranthene	2.40E-01	5.54E-09	7.73E-07	4.04E-09	NA	9.36E-09	2.16E-09	3.01E-07	1.58E-09	NA	**5.62E-09**	**NA**
Total ILCR or HI				**2.52E-07**	**7.04E-02**				**3.19E-08**	**6.18E-03**	**2.84E-07**	**7.65E-02**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per centimeter squared.

Table D-8

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact				
	EPC	Adult Dose	Child Dose	Resident	Adult Dose Absorbed	Adult Dose	Child Dose Absorbed	Child Dose	Resident
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	mg/cm^2-day	mg/kg-day	mg/cm^2-day	mg/kg-day	ILCR
Inorganics									
Arsenic	2.28E+01	9.62E-06	2.24E-05	4.81E-05	4.78E-08	1.28E-06	1.37E-07	2.10E-06	5.06E-06
Thallium	1.47E+00	6.23E-07	1.45E-06	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds									
Benzo(a)anthracene	1.56E-01	6.59E-08	1.54E-07	1.60E-07	1.42E-09	3.80E-08	4.06E-09	6.22E-08	7.32E-08
Benzo(a)pyrene	1.68E-01	7.10E-08	1.66E-07	1.73E-06	1.53E-09	4.09E-08	4.37E-09	6.70E-08	7.88E-07
Benzo(b)fluoranthene	1.91E-01	8.07E-08	1.88E-07	1.96E-07	1.74E-09	4.65E-08	4.97E-09	7.62E-08	8.96E-08
Total ILCR				**5.02E-05**					**6.01E-06**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.
mg/m^3 - Milligrams per cubic meter.

Table D-8

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Adult Dose mg/kg-day	Inhalation Child Dose mg/kg-day	Inhalation Resident ILCR	**All Pathways Total ILCR**
Inorganics					
Arsenic	4.48E-08	4.21E-09	2.46E-09	1.00E-07	**5.33E-05**
Thallium	2.90E-09	2.73E-10	1.59E-10	NA	**NA**
Semivolatile Organic Compounds					
Benzo(a)anthracene	3.07E-10	2.89E-11	1.68E-11	1.42E-11	**2.34E-07**
Benzo(a)pyrene	3.31E-10	3.11E-11	1.81E-11	1.53E-10	**2.52E-06**
Benzo(b)fluoranthene	3.76E-10	3.53E-11	2.06E-11	1.73E-11	**2.86E-07**
Total ILCR				**1.00E-07**	**5.63E-05**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.
mg/m^3 - Milligrams per cubic meter.

Table D-9

On-Site Child Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC	Child Dose	Child Resident	Dose Absorbed	Child Dose	Child Resident	in Air C_a	Child Dose	Child Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Arsenic	2.28E+01	2.62E-04	8.73E-01	1.37E-07	2.44E-05	8.15E-02	4.48E-08	2.87E-08	NA	**9.54E-01**
Thallium	1.47E+00	1.70E-05	2.61E-01	NA	NA	NA	2.90E-09	1.86E-09	NA	**2.61E-01**
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	1.80E-06	NA	4.06E-09	7.26E-07	NA	3.07E-10	1.96E-10	NA	**NA**
Benzo(a)pyrene	1.68E-01	1.93E-06	NA	4.37E-09	7.82E-07	NA	3.31E-10	2.12E-10	NA	**NA**
Benzo(b)fluoranthene	1.91E-01	2.20E-06	NA	4.97E-09	8.89E-07	NA	3.76E-10	2.41E-10	NA	**NA**
Total HI			**1.13E+00**			**8.15E-02**			**NA**	**1.22E+00**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.
mg/m^3 - Milligrams per cubic meter.

Table D-10

On-Site Adult Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC	Adult Dose	Adult Resident	Dose Absorbed	Adult Dose	Adult Resident	in Air C_a	Adult Dose	Adult Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Inorganics										
Arsenic	2.28E+01	2.81E-05	9.35E-02	4.78E-08	3.73E-06	1.24E-02	4.48E-08	1.23E-08	NA	**1.06E-01**
Thallium	1.47E+00	1.82E-06	2.80E-02	NA	NA	NA	2.90E-09	7.95E-10	NA	**2.80E-02**
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	1.92E-07	NA	1.42E-09	1.11E-07	NA	3.07E-10	8.42E-11	NA	**NA**
Benzo(a)pyrene	1.68E-01	2.07E-07	NA	1.53E-09	1.19E-07	NA	3.31E-10	9.07E-11	NA	**NA**
Benzo(b)fluoranthene	1.91E-01	2.35E-07	NA	1.74E-09	1.36E-07	NA	3.76E-10	1.03E-10	NA	**NA**
Total HI			**1.21E-01**			**1.24E-02**			**NA**	**1.34E-01**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.
mg/m^3 - Milligrams per cubic meter.

Table D-11

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Sediment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact					All
		Adult	Child		Dose	Adult	Dose	Child		**Pathways**
Chemicals of Potential Concern	EPC mg/kg	Dose mg/kg-day	Dose mg/kg-day	Resident ILCR	Absorbed mg/cm^2-day	Dose mg/kg-day	Absorbed mg/cm^2-day	Dose mg/kg-day	Resident ILCR	**Total ILCR**
Inorganics										
Arsenic	6.40E+00	3.01E-07	7.01E-07	1.50E-06	1.34E-09	5.35E-09	3.84E-09	8.75E-09	2.11E-08	**1.52E-06**
Chromium, total	1.08E+01	5.07E-07	1.18E-06	NA	NA	NA	NA	NA	NA	**NA**
Semivolatiles Organic Compounds										
Benzo(a)pyrene	1.58E-01	7.42E-09	1.73E-08	1.81E-07	1.44E-10	5.72E-10	4.11E-10	9.36E-10	1.10E-08	**1.92E-07**
Benzo(b)fluoranthene	2.40E-01	1.13E-08	2.63E-08	2.74E-08	2.18E-10	8.69E-10	6.24E-10	1.42E-09	1.67E-09	**2.91E-08**
Total ILCR				**1.71E-06**					**3.38E-08**	**1.74E-06**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per centimeter squared.

Table D-12

On-Site Child Resident Noncancer Risk, Future Scenario, Exposure to Sediment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			All
		Child		Dose	Child		Pathways
Chemicals of Potential Concern	EPC mg/kg	Dose mg/kg-day	Child HQ	Absorbed mg/cm^2-day	Dose mg/kg-day	Child HQ	**Total HI**
Inorganics							
Arsenic	6.40E+00	8.18E-06	2.73E-02	3.84E-09	1.02E-07	3.40E-04	**2.76E-02**
Chromium, total	1.08E+01	1.38E-05	6.58E-04	NA	NA	NA	**6.58E-04**
Semivolatiles Organic Compounds							
Benzo(a)pyrene	1.58E-01	2.02E-07	NA	4.11E-10	1.09E-08	NA	**NA**
Benzo(b)fluoranthene	2.40E-01	3.07E-07	NA	6.24E-10	1.66E-08	NA	**NA**
Total HI			**2.79E-02**			**3.40E-04**	**2.83E-02**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per centimeter squared.

Table D-13

On-Site Adult Resident, Noncancer Risk, Future Scenario, Exposure to Sediment
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			**All**
		Adult		Dose	Adult		**Pathways**
	EPC	Dose	Adult	Absorbed	Dose	Adult	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	**HI**
Inorganics							
Arsenic	6.40E+00	8.77E-07	2.92E-03	1.34E-09	1.56E-08	5.20E-05	**2.97E-03**
Chromium, total	1.08E+01	1.48E-06	7.05E-05	NA	NA	NA	**7.05E-05**
Semivolatiles Organic Compounds							
Benzo(a)pyrene	1.58E-01	2.16E-08	NA	1.44E-10	1.67E-09	NA	**NA**
Benzo(b)fluoranthene	2.40E-01	3.29E-08	NA	2.18E-10	2.53E-09	NA	**NA**
Total HI			**2.99E-03**			**5.20E-05**	**3.04E-03**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per centimeter squared.

Table D-14

On-Site Resident, Future Scenario, Cancer Risk from Exposure to Overburden Monitoring Well Groundwater
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact					Inhalation of VOCs				All
Chemicals of Potential Concern	EPC mg/L	Adult Dose mg/kg-day	Child Dose mg/kg-day	ILCR	Dose Absorbed mg/cm^2-day	Adult Dose mg/kg-day	Dose Absorbed mg/cm^2-day	Child Dose mg/kg-day	ILCR	Concentration in Air mg/m^3	Adult Dose mg/kg-day	Child Dose mg/kg-day	ILCR	**Pathways Total ILCR**
Inorganics														
Arsenic	8.02E-03	7.53E-05	4.40E-05	1.79E-04	1.60E-09	1.51E-07	2.67E-09	9.66E-08	3.71E-07	NA	NA	NA	NA	**1.79E-04**
Chromium, Total	1.30E-03	1.22E-05	7.12E-06	NA	2.60E-10	2.44E-08	4.33E-10	1.57E-08	NA	NA	NA	NA	NA	**NA**
Cobalt	1.75E-03	1.64E-05	9.57E-06	NA	1.40E-10	1.31E-08	2.33E-10	8.41E-09	NA	NA	NA	NA	NA	**NA**
Iron	1.35E+00	1.27E-02	7.41E-03	NA	2.70E-07	2.54E-05	4.50E-07	1.63E-05	NA	NA	NA	NA	NA	**NA**
Manganese	1.11E+00	1.04E-02	6.06E-03	NA	2.21E-07	2.08E-05	3.68E-07	1.33E-05	NA	NA	NA	NA	NA	**NA**
General Chemistry														
Sulfate	5.38E+02	5.05E+00	2.95E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**
Total ILCR				**1.79E-04**					**3.71E-07**				**NA**	**1.79E-04**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
mg/L - Milligrams per liter.
mg/cm^2 - Milligrams per square meter.
mg/kg - Milligrams per kilogram.
mg/m^3- Milligrams per cubic meter.

Table D-15

Child On-Site Resident, Future Scenario, Noncancer Hazard from Exposure to Overburden Monitoring Well Groundwater
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			All Pathways Total
Chemicals of Potential Concern	EPC mg/L	Child Dose mg/kg-day	HQ	Dose Absorbed mg/cm^2-day	Child Dose mg/kg-day	HQ	Concentration in Air mg/m^3	Child Dose mg/kg-day	HQ	**HI**
Inorganics										
Arsenic	8.02E-03	5.13E-04	1.71E+00	2.67E-09	1.13E-06	3.76E-03	NA	NA	NA	**1.71E+00**
Chromium, Total	1.30E-03	8.31E-05	3.96E-03	4.33E-10	1.83E-07	6.76E-04	NA	NA	NA	**4.63E-03**
Cobalt	1.75E-03	1.12E-04	3.72E-01	2.33E-10	9.81E-08	3.27E-04	NA	NA	NA	**3.72E-01**
Iron	1.35E+00	8.64E-02	1.23E-01	4.50E-07	1.90E-04	NA	NA	NA	NA	**1.23E-01**
Manganese	1.11E+00	7.07E-02	1.50E+00	3.68E-07	1.55E-04	8.18E-02	NA	NA	NA	**1.59E+00**
General Chemistry										
Sulfate	5.38E+02	3.44E+01	NA	NA	NA	NA	NA	NA	NA	**NA**
Total HI			**3.71E+00**			**8.65E-02**			**NA**	**3.80E+00**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/L - Milligrams per liter.
mg/cm^2 - Milligrams per square meter.
mg/kg - Milligrams per kilogram.
mg/m^3- Milligrams per cubic meter.

Table D-16

Child On-Site Resident, Future Scenario, Noncancer Hazard from Exposure to Overburden Monitoring Well Groundwater
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Inhalation of VOCs			All Pathways Total
Chemicals of Potential Concern	EPC mg/L	Noncancer Dose mg/kg-day	HQ	Dose Absorbed mg/cm^2-day	Adult Dose mg/kg-day	HQ	Concentration in Air mg/m^3	Adult Dose mg/kg-day	HQ	**HI**
Inorganics										
Arsenic	8.02E-03	2.20E-04	7.33E-01	1.60E-09	4.40E-07	1.47E-03	NA	NA	NA	**7.34E-01**
Chromium, Total	1.30E-03	3.56E-05	1.70E-03	2.60E-10	7.12E-08	2.64E-04	NA	NA	NA	**1.96E-03**
Cobalt	1.75E-03	4.78E-05	1.59E-01	1.40E-10	3.83E-08	1.28E-04	NA	NA	NA	**1.60E-01**
Iron	1.35E+00	3.70E-02	5.29E-02	2.70E-07	7.41E-05	NA	NA	NA	NA	**5.29E-02**
Manganese	1.11E+00	3.03E-02	6.45E-01	2.21E-07	6.06E-05	3.19E-02	NA	NA	NA	**6.77E-01**
General Chemistry										
Sulfate	5.38E+02	1.47E+01	NA	NA	NA	NA	NA	NA	NA	**NA**
Total HI			**1.59E+00**			**3.38E-02**			**NA**	**1.63E+00**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
mg/L - Milligrams per liter.
mg/cm^2 - Milligrams per square meter.
mg/kg - Milligrams per kilogram.
mg/m^3- Milligrams per cubic meter.

Table D-17

Adult Hunter, Future Scenario, Exposure to Surface Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
	EPC	Cancer Dose	Noncancer Dose	Adult Hunter	Adult Hunter	Dose Absorbed	Cancer Dose	Noncancer Dose	Adult Hunter	Adult Hunter
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	mg/cm^2-day	mg/kg-day	mg/kg-day	ILCR	HQ
Inorganics										
Arsenic	2.88E+01	6.77E-07	1.58E-06	1.01E-06	5.26E-03	1.73E-07	1.34E-07	3.13E-07	2.01E-07	1.04E-03
Thallium	2.69E+00	6.31E-08	1.47E-07	NA	2.26E-03	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	1.56E-01	3.66E-09	8.55E-09	2.67E-09	NA	4.06E-09	3.14E-09	7.33E-09	2.29E-09	NA
Benzo(a)pyrene	1.68E-01	3.95E-09	9.21E-09	2.88E-08	NA	4.37E-09	3.38E-09	7.90E-09	2.47E-08	NA
Benzo(b)fluoranthene	2.38E-01	5.59E-09	1.30E-08	4.08E-09	NA	6.19E-09	4.80E-09	1.12E-08	3.50E-09	NA
Total ILCR and HI				**1.05E-06**	**7.53E-03**				**2.31E-07**	**1.04E-03**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.

Table D-17

Adult Hunter, Future Scenario, Exposure to Surface Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Concentration in Forage C_p	Concentration in Venison C_v	Consumption of Venison				**All Pathways**	
			Cancer Dose	Noncancer Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Inorganics								
Arsenic	NA	NA	NA	NA	NA	NA	**1.22E-06**	**6.30E-03**
Thallium	1.34E-03	2.80E-07	2.14E-11	4.99E-11	NA	7.68E-07	**NA**	**2.26E-03**
Semivolatile Organic Compounds								
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	**4.97E-09**	**NA**
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	**5.35E-08**	**NA**
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	**7.58E-09**	**NA**
Total ILCR and HI					**NA**	**7.68E-07**	**1.28E-06**	**8.57E-03**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.
mg/cm^2 - Milligrams per square meter.

Table D-18

Hunter's Child, Future Scenario, Exposure to Surface Soil
Ash Pit No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	EPC mg/kg	Concentration in Forage C_p mg/kg	Concentration in Venison C_v mg/kg	Consumption of Venison: Cancer Dose mg/kg-day	Consumption of Venison: Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Inorganics									
Arsenic	2.88E+01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Thallium	2.69E+00	1.34E-03	2.80E-07	7.68E-12	8.96E-11	NA	1.38E-06	**NA**	**1.38E-06**
Semivolatile Organic Compounds									
Benzo(a)anthracene	1.56E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Benzo(a)pyrene	1.68E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Benzo(b)fluoranthene	2.38E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR and HI						**NA**	**1.38E-06**	**NA**	**1.38E-06**

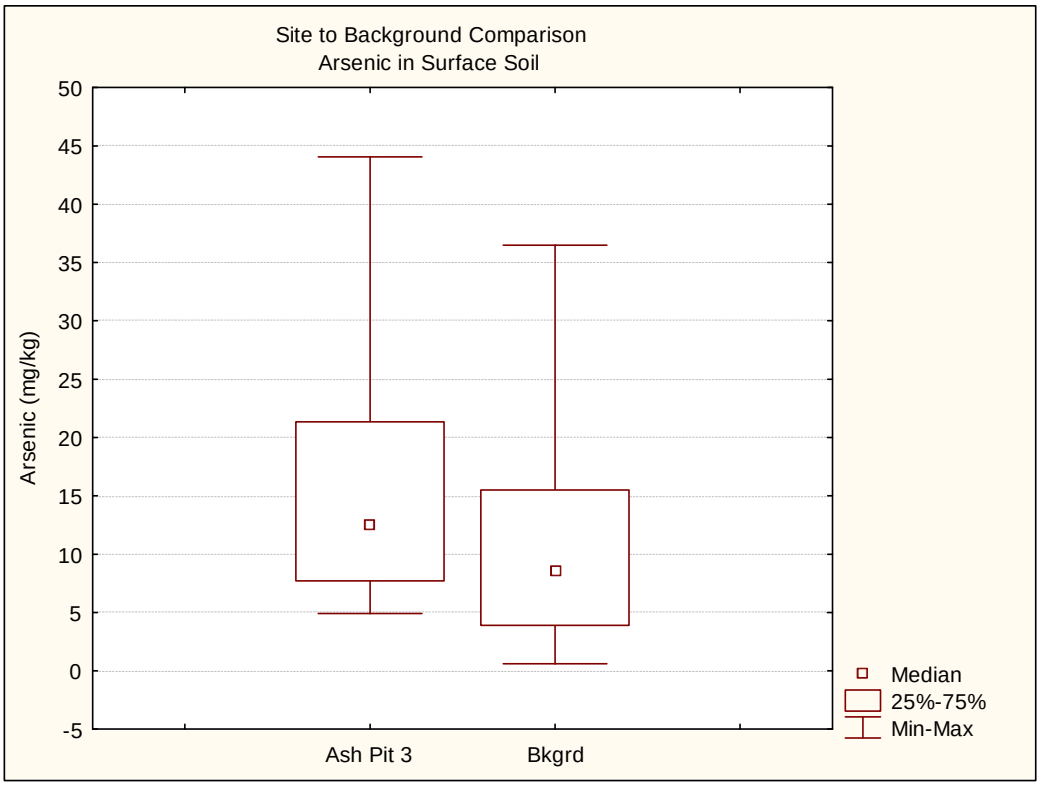
EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligrams per kilogram.

APPENDIX E

WILCOXON RANK SUM STATISTICAL TEST OUTPUT

Site to Background Evaluation for Metals in Surface Soil - AP 3

	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Arsenic	167.0000	428.0000	77.00000	1.096197	0.272993	1.096449	**0.272883**	8	26	0.288221
Thallium	139.0000	422.0000	97.00000	0.126025	0.899712	0.126608	**0.899250**	8	25	0.918057



Site to Background Evaluation for Metals in Total Soil - AP 3

	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Arsenic	408.0000	495.0000	144.0000	1.65764	0.097392	1.65784	**0.097351**	16	26	0.100440
Thallium	295.5000	565.5000	159.5000	-1.08241	0.279072	-1.08515	**0.277855**	16	25	0.282616

RESPONSE TO COMMENTS

Responses to Ohio Environmental Protection Agency Comments on the Draft Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 and the BHHRA and Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio, Dated June 12, 2013

The BHHRA and SLERA documents were reviewed by Ohio EPA, who had no comments as indicated by correspondence received from Paul Jayko on August 6, 2013.

APPENDIX I

ASH PIT NO. 3 SLERA

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Final
January 2012

Screening Level Ecological Risk Assessment
Ash Pit 3

Former Plum Brook Ordnance Works
Sandusky, Ohio

FUDS Project No. G05OH001821

US Army Corps
of Engineers
Nashville District

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Final
January 2012

Screening Level Ecological Risk Assessment
Ash Pit 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

FUDS Project No.
G05OH001821

Shaw®

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January 11, 2012

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Kathy McClanahan)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Submittal of the Final Screening Level Ecological Risk Assessment
Ash Pit 3
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 Shaw is pleased to submit the Final Screening Level Ecological Risk Assessment for Ash Pit 3 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report was prepared consistent with those prepared for other PBOW sites, the agreements among the PBOW project delivery team members, and specifically the Ash Pit 3 Screening Level Ecological Risk Assessment work plan. Responses to comments received on the draft risk assessment report have been incorporated into the final report and are attached to this document. The Baseline Human Health Risk Assessment for Ash Pit 3 will be distributed at a later date following completion of additional groundwater sampling and analysis that is currently being performed at the site.

Enclosed for your review are four copies of these reports. Copies have also been sent to those on the distribution list as indicated for their review. As requested, the document was sent to the Center of Expertise and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven T. Downey, PE, PMP
Project Manager

Enclosures

Control Copy Distribution List

Name	Control Copy
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DISCIPLINE SIGN-OFF REVIEW

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Screening Level Ecological Risk Assessment for Ash Pit 3 Remedial Investigation
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013 Delivery Order No. DX02

Project No. 132457 Task/Phase Number: 12000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
☐	Report		**Document Status**
X	Risk Assessment / Evaluation	Screening Level Ecological Risk Assessment	☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
☐	Other:		☐ Other:

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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Screening-Level Ecological Risk Assessment
Ash Pit 3

Plum Brook Ordnance Works,
Sandusky, Ohio

Prepared for:

U.S. Army Corps of Engineers
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Nashville, Tennessee 37202-1070

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FUDS Project No. G05OH001821
Shaw Project No. 132457

January 2012

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List of Acronyms

AP3	Ash Pit 3
ARP	assessment receptor profile
AUF	area use factor
BAF	bioaccumulation factor
BERA	baseline ecological risk assessment
bgs	below ground surface
BSC	background screening concentration
COPEC	chemical of potential ecological concern
CT	central tendency
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ESCM	ecological site conceptual model
ESV	ecological screening value
HQ	hazard quotient
IAEA	International Atomic Energy Agency
IT	IT Corporation
K_{ow}	octanol-water partition coefficient
LOAEL	lowest-observed-adverse-effect level
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NASA	National Aeronautics and Space Administration
NOAEL	no-observed-adverse-effect level
NWI	National Wetland Inventory
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
PAH	polynuclear aromatic hydrocarbons
PBOW	Plum Brook Ordnance Works
RME	reasonable maximum exposure
Shaw	Shaw Environmental, Inc.
SLERA	screening-level ecological risk assessment
TNT	trinitrotoluene
TNTA	TNT Area A

List of Acronyms *(continued)*

TNTB	TNT Area B
TNTC	TNT Area C
TRV	toxicity reference value
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
WRS	Wilcoxon Rank Sum

Executive Summary

Screening-level ecological risk assessments were performed to provide an estimate of current and future ecological risks associated with potential hazardous substance releases within the former Ash Pit 3 (AP3) site at Plum Brook Ordnance Works in Sandusky, Ohio. The results of the screening-level ecological risk assessments contribute to the overall characterization of the site and serve as part of the baseline used to develop, evaluate, and select appropriate remedial alternatives, if necessary. The primary objective of the assessments was to determine the potential for unacceptable risks to ecological receptors as a result of exposure to chemicals detected at the site. This objective was met by characterizing the ecological communities in the vicinity of the site, determining the particular hazardous substances being released from the site, identifying pathways for receptor exposure, and estimating the magnitude and likelihood of potential risk to identified receptors. The assessment addresses the potential for adverse effects to the vegetation, wildlife, aquatic life, and endangered and threatened species.

Vegetative communities at the site were classified during two site reconnaissance trips. AP3 is a 1.5-acre site that is characterized by a circular marsh area in the depression of the old ash pit surrounded by successional forest. A creek channel that sporadically contains water leads from the former ash pit depression and flows to the west. AP3 site is classified as a wetland. Vegetative stress attributable to chemicals was not observed at the site during site reconnaissance trips. An active bald eagle nest was present at AP3. Bald eagles are a state-threatened species in Ohio. No other state- or federally listed species were identified at AP3. Based on the site reconnaissance information, there was no indication that ecological threats exist at the site, as there was no definitive absence of biota or animal life in areas expected to support these ecological components.

The maximum detected concentrations of chemicals detected in sampled media were compared with risk-based screening ecotoxicity values during an initial screening step. Chemicals that exceeded the screening values (or for which no screening values were available) and that failed additional screening criteria (e.g., comparison with background data, nutrient status, frequency of detection, etc.) were retained as chemicals of potential ecological concern (COPEC) and assessed further. It is noted that the background screening protocol, which is based on Plum Brook Project Delivery Team agreement, differs somewhat from the current Ohio Environmental Protection Agency guidance. For AP3, three chemicals in soil, one chemical in surface water, and four chemicals in sediment were identified as COPECs for further evaluation. Ninety-five percent

upper confidence limits were calculated for these chemicals (if appropriate) and selected as their exposure point concentrations during the subsequent stages of the risk assessment.

Eight representative receptor species that are expected to potentially reside at the site were selected as indicator species for estimating the potential effects of the COPECs. The eight species selected included the deer mouse, short-tailed shrew, Eastern cottontail rabbit, marsh wren, white-tailed deer, raccoon, red-tailed hawk, and muskrat. The raccoon and muskrat were evaluated for semiaquatic or aquatic exposure.

The assessment endpoints for the site were the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals. Measurement assessment endpoints, or measurable responses to stressors, included lowest-observed-adverse-effect levels and no-observed-adverse-effect levels, collectively termed toxicity endpoint values.

Measurable responses to stressors, collectively termed toxicity reference values, were selected as measurement endpoints. The most appropriate measurement endpoints were chosen based on exposure pathways as well as ecotoxicity of the contaminant. An exposure analysis combining the spatial and temporal distribution of the assessment receptors and the COPECs was performed to evaluate potential exposure. The focus of the analysis was dependent on the assessment receptors evaluated and the assessment and measurement endpoints.

The intake estimates were combined with the toxicity reference values to derive estimates of potential adverse ecological effects. The uncertainties associated with the estimation of potential adverse ecological effects were identified, with the degree of uncertainty estimated qualitatively or quantitatively and the impact of the uncertainty estimated qualitatively (overestimate or underestimate, as appropriate).

Risk characterization integrates information on exposure, exposure-effects relationships, and defined or presumed target populations. The result is an estimate of the likelihood, severity, and characteristics of adverse effects to ecological receptors resulting from exposure to environmental stressors present at the site. Qualitative and semiquantitative approaches were taken to estimate the likelihood of adverse effects occurring as a result of exposure of the selected site receptors to chemicals.

For the semiquantitative predictive assessment, toxicity reference values and exposure rates were calculated and used to generate hazard quotients by dividing the receptor exposure rate for each chemical by the calculated toxicity reference values. Hazard quotients are a means of estimating the potential for adverse effects to organisms at a contaminated site and for assessing the potential for toxicological effects to occur.

For soil, terrestrial invertebrates and plants may have slightly elevated hazard based upon the exceedance of ecological benchmarks. However, only three chemicals in AP3 soil exceeded benchmarks, and the concentrations were not highly elevated. Given the conservative nature of benchmark values, it is unlikely that these communities are adversely impacted at the site. Ecological hazard from soil was primarily evaluated using food chain models for the selected terrestrial assessment receptors (i.e., deer mouse, short-tailed shrew, Eastern cottontail rabbit, marsh wren, white-tailed deer, raccoon, and red-tailed hawk). The red-tailed hawk was evaluated using only the more conservative no-effect toxicity reference values to achieve a higher level of protection for the species it represents, the state-threatened bald eagle. Only thallium in soil exceeded the threshold value of 1 at AP3 for the deer mouse and short-tailed shrew receptors. However, thallium was only detected in 2 out of 16 samples at concentrations exceeding ecological and background screening levels and only marginally exceeded these threshold concentrations. Further, the small area where elevated concentrations were detected is spatially irrelevant for most ecological receptors. Therefore, the potential for adverse ecological impacts associated with thallium or any other chemical in soil is considered to be minor at this site.

For surface water and sediment, benthic invertebrates and plants may have slightly elevated hazard based upon the exceedance of ecological benchmarks. However, due to the limited aquatic habitat present at the site and the limited number of exceedances, it is unlikely that these communities are significantly impacted. Ecological hazard from surface water and sediment was primarily evaluated using a food chain model for the selected aquatic assessment receptors (i.e., the raccoon and muskrat) at AP3. Based on the food chain model results, the aquatic receptors were not predicted to have elevated hazards from exposure to chemicals in sediment or surface water at the site.

Based on the findings of the screening-level ecological risk assessment, the potential for adverse effects to populations of ecological receptors exposed to chemicals in soil, surface water, and sediment at AP3 is expected to be very low. No chemicals at this site appear to require further evaluation for ecological purposes alone.

1.0 Introduction

This screening-level ecological risk assessment (SLERA) evaluates the potential for adverse effects posed to ecological receptors from potential releases at the former Ash Pit 3 (AP3) at the former Plum Brook Ordnance Works (PBOW). This SLERA was performed as described in the work plan for this site (Shaw Environmental, Inc. [Shaw], 2009), with some modifications made to accommodate current practices in the field of ecological risk assessment. This document is consistent with the ecological risk assessment process described in U.S. Environmental Protection Agency (EPA) guidance (e.g., EPA [1997]) and Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response (OEPA, 2008) guidance, as well as with the procedures established in previous ecological risk assessments performed at PBOW (e.g., IT Corporation [IT], 2001a; Shaw, 2010).

This work is being conducted by Shaw for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites and managed by the USACE Huntington District, with technical oversight provided by the USACE Nashville District.

1.1 Facility Description and Location

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene, and pentolite (USACE, 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNT Area A (TNTA), TNT Area B (TNTB), and TNT Area C (TNTC). Twelve process lines

were used in the manufacture of TNT, including four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the War Department in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After decontamination, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration after it was certified by the U.S. Army to be decontaminated. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the Plum Brook depot areas, which consist of approximately 2,800 acres. The Department of the Army reacquired the 3,230 acres in 1954 and performed remedial efforts from the mid-1950s until 1963. In 1955, the Army completed further decontamination of manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody of the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; and removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were likewise buried. All materials, including the soil in those areas, were flashed. The area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc., 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of their John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the facility are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the

excess acreage and uses this area as a bus transportation area. The General Services Administration retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. NASA currently controls approximately 6,400 acres. The details of land transactions are listed in the *Site Management Plan* (USACE, 1995).

1.3 Ash Pit 3 Description and History

As noted previously, PBOW was built in early 1941 and manufactured TNT, dinitrotoluene, and pentolite until 1945. Three power stations, Power House 1, Power House 2, and Power House 3, were constructed and utilized to support the TNT manufacturing process. Each power station consisted of a main power house, a coal storage area, and an aboveground fuel storage tank. The power house buildings also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal ash generated from each of the boilers in the power house was collected in pits. Water was added to the ash, producing a slurry that flowed through a sluice trench to an ash sump located at the end of each power house. From the ash sump, the ash slurry traveled through a pipeline to a nearby surface water/ash impoundment, referred to as an "ash pit" (USACE, 1995). This report focuses on the ash pit associated with Power House 3 (i.e., AP3).

AP3 is located approximately 700 feet southwest of the intersection of Maintenance and Ransom Roads and is west of the present NASA K-Site control building (former Power House 3) (Figure 1-2). AP3 is approximately 1.5 acres in size. Operations at the K-Site were officially abandoned in 2007; however, it is possible that the facility may be used for test programs in the future. Abandoned railroad tracks running in a north-south direction are immediately east of AP3. The pit is partially surrounded by thick vegetation, with mature and smaller trees. Based on topographical quadrangle, aerial photographs, and a visual site survey conducted in 1999, AP3 was noted to have essentially remained unchanged. During its operation, the K-Site supplied noncontact cooling water to AP3. The original impoundment was intact as of 1999, holding water supplied by NASA's K-Site Test Facility. A pipe at the northeastern corner of the pit supplied the cooling water. Operations at the K-Site were officially abandoned in 2007. Water discharged from this former ponded area via an east-west-trending drainage ditch that eventually discharges into Pipe Creek. Since the K-Site ceased operations, the major source of water to AP3 has been eliminated and the area is no longer regularly ponded. A review of aerial photographs indicates a lack of open water at AP3 in recent history. NASA (2008) personnel communicated that no water was present in AP3 on July 22, 2008. This was also evident during a September

2008 site visit by USACE and Shaw personnel, although a small ponded area was observed in the southwest corner of the pit after a rain event during an October 2008 site visit, and much of AP3 was covered by up to approximately 1 foot of water during an April 2009 reconnaissance. It should be noted that this 2009 reconnaissance took place the morning after a heavy precipitation event during a wetter than usual spring.

1.4 Scope and Objectives

The objective of this SLERA is to provide an estimate of the potential for adverse ecological effects associated with contamination resulting from former PBOW activities at AP3. The results of the SLERA will contribute to the overall characterization of the site and may be used to determine the need for additional investigations or to develop, evaluate, and select appropriate remedial alternatives. Guidance documents used to perform the SLERA include the general guidelines of the *Tri-Service Procedural Guidelines for Ecological Risk Assessments* (Wentsel, et al., 1996), *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1997), *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Guidance Bulletin No. 1* (EPA, 1996), and *Guidance for Conducting Ecological Risk Assessments* (OEPA, 2008). The SLERA fits into Steps 1 and 2 of the ecological risk assessment guidance for Superfund process (EPA, 1997) and Level I through a maximum of Level III evaluation using the OEPA (2008) process.

The goal of the SLERA is to evaluate the potential for adverse ecological effects to ecological receptors from site-related contaminants at AP3. This objective is met by characterizing the ecological communities in the vicinity of the site, determining the particular contaminants present, identifying pathways for receptor exposure, and estimating the magnitude of the likelihood of potential adverse effects to identified receptors. The SLERA addresses the potential for adverse effects to the vegetation, wildlife, aquatic life (e.g., sediment-dwelling organisms), threatened and endangered species, and wetlands or other sensitive habitats associated with the site.

Concentrations of chemicals measured in relevant environmental media were used to perform a SLERA, which includes a problem formulation (Chapter 2.0), exposure characterization (Chapter 3.0), ecological effects characterization (Chapter 4.0), risk characterization (Chapter 5.0), and summary and conclusions and recommendations (Chapter 6.0). These subtasks are described in greater detail in the following sections.

The chemicals of potential ecological concern (COPEC), the ecosystems and receptors at risk, the ecotoxicity of the contaminants known or suspected to be present, and observed or anticipated ecological effects are evaluated in this SLERA. This evaluation is conducted in two steps: (1) a screening assessment step and (2) a predictive assessment step. Ecological endpoints to be addressed in both steps are identified. The results and conclusions of the screening assessment determine whether a predictive assessment is needed. The criteria by which the need for a predictive assessment is measured are formalized as null hypotheses to be accepted (in which case a predictive assessment is not needed) or rejected (in which case a predictive assessment is needed).

2.0 Problem Formulation

The screening assessment null hypotheses are stated as follows:

- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of viable habitat for potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential exposure pathways.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential chemical stressors.

If one or more of these null hypotheses are accepted, a predictive assessment is not triggered. All four null hypotheses must be rejected for a predictive assessment to be triggered. The first three null hypotheses are tested with the results of the ecological site description, the pre-assessment reconnaissance, the documentation of potential receptors of special concern and critical habitats, and the determination of significant ecological threats (Section 2.1). The fourth null hypothesis is tested with the results of COPEC selection (Section 2.2).

If a predictive assessment is triggered, terrestrial and aquatic ecological conceptual site models are developed, as appropriate, and additional problem formulation tasks are performed as described in Sections 2.3 through 2.5.

2.1 Ecological Site Description

This ecological site description section includes a general discussion of site background and the area of concern, surface water resources, wetlands, and vegetative communities; a species inventory; and a discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities. A photographic record was made during the site reconnaissance visits (Figure 2-1). Information was obtained on the presence of state- and federally listed, threatened, and endangered species; species of special concern; and wildlife and fisheries resources. A botanist searched for threatened and endangered plant species. A checklist of biological species present at the site was developed using existing site investigation reports, environmental data sources mentioned previously, and information gathered during the site reconnaissance.

Information on unique and special-concern habitats, preserves, wildlife refuge parks, and natural areas within the general vicinity was also obtained.

2.1.1 General Site Background

PBOW, approximately 6,400 acres in size, is located within the Eastern Lake Plains physiographic region of the Eastern Huron/Erie Lake Plain Ecoregion (Lafferty, 1979; Omernik, 1986). This region is generally characterized as containing flat plains as the predominant land-surface form and as having a dominant natural vegetation of elm and ash in undisturbed areas. Approximately two-thirds of Erie County was once covered by a glacial lake that produced features such as beach ridges and wave-cut cliffs. Much of the region is poorly drained due to the flat topography and low stream gradients. Many of the wetlands adjacent to Lake Erie in this region have been preserved by various federal, state, and private organizations (Peterjohn and Rice, 1991), thereby providing important wetland habitat for wildlife.

Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. Elevations range from 675 feet above mean sea level at the southwest edge of the site to 625 feet above mean sea level in the northern portion of the property at Bogart Road, resulting in an average slope of approximately 0.3 percent. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (Ohio Department of Natural Resources [ODNR], 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second-generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within a sea of agricultural land in north-central Ohio.

AP3, approximately 1.5 acres in size, is located in a flat, circular depression west of Ransom Road. Water discharges from this depression via an east-west-trending drainage ditch that eventually discharges into Pipe Creek to the west. Site reconnaissance visits were performed by Shaw ecologists on October 16, 2008, and April 29 and June 2, 2009. A photographic record of the site was prepared during these site visits and is presented as Figure 2-1. Prior to arrival at the site, Shaw personnel obtained relevant information on the site, including topographic, township, county, or other appropriate maps, which were used to determine the location of potential ecological units such as streams, creeks, ponds, grasslands, forest, and wetlands on or near the site. Additionally, biological inventories performed in 1994 and 2001 at PBOW (ODNR, 1995; NASA, 2002) that identify and indicate the locations of threatened and endangered species at the installation were reviewed. Shaw personnel completed a checklist similar to EPA's checklist for ecological assessment/sampling (EPA, 1997), and information from this checklist was used to complete the ecological site description in this chapter. The location of known or potential

contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Shaw personnel also used the reconnaissance to search for any indication of potential effects from contaminant release.

2.1.2 Surface Water

Due to the lack of topography at the site, surface water tends to pool in localized shallow depressions. Based on reports from site personnel, AP3 is often dry, but water pools in the lowest portion in the southwest corner of the depression after periods of rainfall and is retained for some period of time. Standing water was present in this area during one site visit (Photo 4 on Figure 2-1) and was present throughout the entire depression area during the other two site visits (Photos 6 and 7 on Figure 2-1). It should be noted that all three site reconnaissance visits were performed within several days of heavy rain. AP3 drains to a drainage ditch that exits the site to the west. Water was not observed in the drainage ditch during the October 2008 site visit (Photo 3 on Figure 2-1).

2.1.3 Wetlands

According to the National Wetland Inventory (NWI) maps for the area (U.S. Fish and Wildlife Service, 2010), AP3 is identified as a freshwater pond wetland (wetland classification code PUBG, i.e., a palustrine system with an unconsolidated bottom, intermittently exposed). It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes (such as those present at PBOW) because minor depressions often contain isolated wetlands not easily identified through interpretation of aerial photographs (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). It should also be noted that the NWI map classification may have been based on previous anthropogenic conditions (i.e., when AP3 was used as an impoundment for cooling water at the K-Site facility [Section 1.3]).

2.1.4 Vegetative Communities

Vegetative communities at the site were classified during the site reconnaissance trips. Figure 2-2 presents a map of the vegetation communities at AP3. AP3 contains a roughly circular marsh in the former ash pit depression surrounded by upland old field and successional woods. A wetland plant community has formed here. Common plants include *Scirpus cyperinus* (wool grass), *Typha angustifolia* (narrow-leaf cattail), and *Carex* spp. (sedges). Successional woods are found over most of the remainder of this site. The woods contain young to moderate-aged trees, saplings, and shrubs, with a sparse to moderate herbaceous layer. A small patch of upland old field occurs in the southeast corner of the site.

A list of the plant species identified at AP3 is presented in Table 2-1.

During the site reconnaissance, the study area was examined for vegetative stress, including a search for plants displaying stunted growth, poor foliage growth, tissue discoloration, and a loss of leaf coverage. Vegetative stress attributable to chemicals was not observed at AP3. Based on site reconnaissance information, AP3 represents a relatively undisturbed (albeit small) parcel of primarily marsh habitat that is capable of supporting ecological receptors. There was no evidence that significant ecological threats exist at the site.

2.1.5 Species Inventory

Based on information from ODNR (1995) and collected during the site reconnaissance, species lists were prepared for plants, mammals, birds, reptiles, amphibians, and fish (Tables 2-1 through 2-6, respectively). Unless noted on the tables, the species listed in Tables 2-2 through 2-6 apply to the former PBOW as a whole and are not necessarily specific to AP3.

A total of 91 plant species were documented at AP3 during the spring and fall vegetation survey (Table 2-1), which comprises approximately 22 percent of the total number of species documented at the installation either during the 1994 biological inventory (ODNR, 1995) or during vegetation surveys at other sites at the former PBOW (Appendix A).

Based on species range maps that were available, a total of 43 species of mammals may be found in the region (Table 2-2). It is likely that other species are present but were not observed due to the short duration of the field visits. The heavily vegetated and marshy substrate at AP3 helped obscure animal sign at this site.

A total of 130 species of birds are likely to be found in the region based on species range maps and field observations, and 105 species have been recorded at the former PBOW by the ODNR during their multi-year studies (Table 2-3). PBOW lies within a major migratory corridor that is used by birds travelling between their southern wintering grounds and their breeding grounds in Canada. Of the species recorded by the ODNR, 49 are neotropical migrants and would not be expected to nest at the former PBOW. Twenty bird species were documented at AP3 during the site visits performed by Shaw, and 14 of these were identified as being present during the breeding season. An active bald eagle (*Haliaeetus leucocephalus*) nest was present at AP3, and an adult eagle was observed during the spring site reconnaissance (Photo 8 on Figure 2-1). Although the eagle nest was blown down by a storm in 2009, eagles have been observed again using this nesting location during recent site visits. The bald eagle is a state-threatened species and is discussed in greater detail in Section 2.1.6.

Of the 14 species of reptiles that may be found in the region based on species range maps, 10 species (71 percent) have been observed at the former PBOW, including turtles and snakes (ODNR, 1995; Table 2-4). No reptiles were observed during the AP3 site reconnaissance.

Of the 10 species of amphibians that may be found in the region based on species range maps, 9 (90 percent) have been observed at the former PBOW (ODNR, 1995; Table 2-5), including salamanders, toads, and frogs. No amphibians were observed during the AP3 site reconnaissance.

According to ODNR (1995), a combination of electroshocking and seining was conducted during the field investigation that identified 14 species of fish at PBOW. Species observed included suckers, sunfish, minnows, sticklebacks, and bullheads (Table 2-6). Aquatic habitat sufficient to support fish populations is limited at AP3, and no fish were observed during site reconnaissance visits.

2.1.6 Threatened and Endangered Species Information

According to an Ohio Division of Natural Areas and Preserves review of their natural heritage maps and files (ODNR, 2010), there are records of State of Ohio threatened or endangered species within a 2-mile radius of the site (no species on the federal list were identified). These species include the following:

- Bushy aster (*Symphyotrichum dumosum*) - endangered
- Canada St. John's wort (*Hypericum canadense*) – endangered
- Flat-leaved rush (*Juncus platyphyllus*) – endangered
- Rough rattlesnake-root (*Prenanthes aspera*) – endangered
- Ashy sunflower (*Helianthus mollis*) – threatened
- Dwarf bulrush (*Lipocarpha micrantha*) – threatened
- Field sedge (*Carex conoidea*) – threatened
- Greene's rush (*Juncus greenei*) – threatened
- Slender spike-rush (*Eleocharis tenuis*) – threatened
- Southern hairy panic grass (*Panicum meridionale*) – threatened
- Thin-leaved sedge (*Carex cephaloidea*) – threatened
- Tufted fescue sedge (*Carex brevior*) – threatened
- Twisted yellow-eye-grass (*Xyris torta*) – threatened
- Upland sandpiper (*Bartramia longicauda*) – threatened.

In addition, based on information contained in ODNR (1995) and NASA (2002), several species of threatened or endangered plants, potentially threatened plants, and threatened or endangered birds have been recorded at PBOW, as follows (current status as of September 2011, if different, is listed in parentheses):

- Grove sandwort (*Arenaria lateriflora*) – threatened (**not listed**)
- Purple triple-awned grass (*Aristida purpurenscens*) – potentially threatened
- Prairie false indigo (*Baptisia lactea*) - potentially threatened
- Broad-winged sedge (*C. alata*) - potentially threatened
- Round-fruited hedge-hyssop (*Gratiola virginiana*) - potentially threatened
- Tall St. John's wort (*H. majus*) - potentially threatened (**not listed**)
- Least St. John's Wort (*H. gymnanthum*) - endangered
- Rough pennyroyal (*Hedeoma hispidum*) – threatened (**potentially threatened**)
- Butternut (*Juglans cinerea*) – potentially threatened (**not listed**)
- Northern panic-grass (*Panicum boreale*) – threatened (**potentially threatened**)
- Virginia meadow beauty (*Rhexia virginica*) - potentially threatened
- Deer's tongue arrowhead (*Sagittaria rigida*) – threatened (**potentially threatened**)
- Tall nut rush (*Scleria triglomerata*) - potentially threatened
- Pale carrion flower (*Smilax herbacea*) – threatened (**not listed**)
- Lance-leaved violet (*Viola lanceolata*) - potentially threatened
- Cattle egret (*Bublucus ibis*) – endangered
- Bald eagle (*Haliaeatus leucocephalis*) – federally threatened (**state-threatened**)
- Black-crowned night heron (*Nycticorax nycticorax*) - threatened
- Trumpeter swan (*Cygnus buccinator*) - endangered
- Indiana bat (*Mytolis sodalis*) – endangered
- Moth, no common name (*Spartiniphaga inops*) – endangered.

The site reconnaissance performed at AP3 as part of the current remedial investigation included detailed searches performed by a qualified botanist subcontractor during the October 2008 and June 2009 site visits. Based on the results of the site reconnaissance, no threatened or endangered plant species were found at AP3.

None of the threatened or endangered bird species listed previously would typically be expected to be found at AP3. The cattle egret, trumpeter swan, and upland sandpiper are all considered rare visitors or migrants at the former PBOW (ODNR, 1995) and have not been documented nesting within 1 mile of the site (ODNR, 2010). The black-crowned night heron, an Ohio threatened species, is a regular visitor at ponds, streams, and ditches within the former PBOW; however, it does not nest at the former PBOW (ODNR, 1995; 2010). The species is typically found near water and wetlands, and since the early 1980s, there has been a nesting colony of approximately 100 pairs located on an island in Sandusky Bay, approximately 10 miles north northwest of the study area (Peterjohn and Rice, 1991). As discussed in Section 2.1.5, a bald eagle nest was observed at AP3, and an adult eagle was present at this site during the site reconnaissance. The bald eagle is an Ohio threatened species. The nest has been used by a pair of eagles for several years, during which time the pair has successfully hatched and fledged a number of young. A strong storm knocked down the nest in May 2009. Two eaglets were recovered from the damaged nest and taken to a raptor rehabilitation facility, and one survived.

The eagle nest was observed to be active again as of 2010. In spring of 2011, base wildlife personnel indicated that at least one eaglet was present in the nest, and an adult was observed perched near the nest during an ecological reconnaissance visit for another PBOW site.

The Indiana bat, the only mammal in the list, has widespread records from throughout Ohio, but is more concentrated in the southwestern portion of the state (NASA, 2002). This species has not been documented at the site and is generally not expected at PBOW because its preferred habitat (e.g., caves along streams or trees with exfoliated bark) is generally lacking at the installation and AP3. Trees with exfoliated bark, such as shagbark or shellbark hickory, are rare or not present at the site, respectively, and provide little bat roosting habitat (Appendix A). No Indiana bats were detected at the installation during the 2001 bat survey at PBOW (NASA, 2002). With the exception of the Erie Sand Barrens State Nature Preserve, there are no existing or proposed state nature preserves or scenic rivers near the site, and ODNR is unaware of any unique ecological sites; geological features; breeding or nonbreeding animal concentrations; champion trees; or state parks, forests, or wildlife areas within a 2-mile radius of the site (ODNR, 2010). The Erie Sand Barrens State Nature Preserve is located southwest of PBOW. The 32-acre preserve is a remnant sand beach of Lake Warren, the fifth ancestral Lake Erie, that supports many threatened and endangered plant species such as field sedge, Least St. John's wort, dwarf bullrush, twisted yellow-eyed-grass, flat-leaved rush, bushy aster, and Virginia meadow beauty. Many of the preserve's rare plant species thrive in open windswept conditions such as those found on the sand barrens. The ODNR Division of Natural Areas and Preserves actively manages the preserve to ensure that the open wind-swept areas remain and do not become overgrown with woody vegetation.

2.1.7 Pre-Assessment Reconnaissance

Shaw ecological scientists performed site visits to AP3 on October 16, 2008 and April 29 and June 2, 2009. The primary purpose of the April site visit was to perform a habitat assessment and fauna inventory at the site, and the visits were intentionally performed during the period when birds are migrating north to their breeding areas so that transient species could be observed. The primary purposes of the June and October site visits were to perform summer and fall walkovers to identify plant species (including threatened and endangered species). During early June, breeding birds are vocalizing as they establish and defend territories, while migrants that breed further to the north have moved on. Therefore, the June visit was also used as a follow-up to the April fauna visit to identify bird species that are using the site during the breeding season. The list of plant species observed during the early summer and fall site walks is presented in Table 2-1. The bird species observed at AP3 are listed in Table 2-3.

Information obtained during the reconnaissance trips was used to select representative receptors, refine exposure scenarios for the risk assessment, and identify protected species or habitats of special concern in the study area. Reconnaissance personnel completed a checklist similar to that on EPA's checklist for ecological assessment/sampling (EPA, 1997) and OEPA's ecological risk assessment guidance (OEPA, 2008). The locations of known or potential contaminant sources affecting the site and the probable gradient of the pathway by which contaminants may be released from the site to the surrounding environment were identified. Reconnaissance personnel used the site visits to evaluate the site for more subtle clues of potential effects from contaminant release.

The methods used to characterize natural resources focused on aquatic and terrestrial resources at the site and within the immediate vicinity. General habitat maps showing the types and extent of vegetation communities present within the immediate vicinity of the site were prepared based on information collected during the site reconnaissance.

2.2 Selection of Chemicals of Potential Ecological Concern

A list of samples used for the AP3 SLERA is presented in Table 2-7. Samples used for the SLERA consisted of historical samples supplemented with more recently collected samples from locations selected to close data gaps and maximize information related to possible contamination presence and distribution at a given site. Sample locations are presented on Figure 2-3. Using the analytical data from samples on these lists, a COPEC selection process was performed to develop a subset of chemicals detected at each site that are not naturally occurring or are associated with non-site-related sources. These chemicals are also present at sufficient frequency, concentration, and location to pose a potential risk to ecological receptors. Screening criteria that were used to identify COPECs are described in more detail in Section 2.2.3.

2.2.1 Data Organization

Chemical analytical data, as well as all previous and ongoing investigations, were reviewed and evaluated for quality, usefulness, and uncertainty. Data identified as being of acceptable quality for use in the SLERA were summarized in a manner that presents the pertinent information to be applied in the SLERA. Any data rejected during the data evaluation as a result of the data evaluation ("R"-qualified data) were identified along with the rejection rationale. Only validated data were used in the SLERA.

The data for each chemical were sorted by medium. For ecological impacts, soil from 0 to 6 feet below ground surface (bgs) was considered. Although the 0 to 6 feet depth interval encompasses soil at depths that are not typically experienced by many ecological receptors, the 0 to 6 feet

depth interval was selected for three primary reasons: (1) to maintain consistency with other PBOW ecological risk assessments (e.g., IT [2001a]), (2) to include potential exposure to ecological receptors that may be exposed to deeper soil, and (3) to increase the size of the total soil database by including samples collected from samples up to 6 feet bgs. Therefore, COPEC selection was performed for the 0 to 6 feet interval. Chemicals that were not detected at least once in a medium were not included in the risk assessments. Available background data were determined for each medium. Potential sources of background information include data from previous and current investigations, as well as monitoring wells in areas unaffected by site activities.

The analytical data included qualifiers from the analytical laboratory quality control or from the data validation process that reflect the level of confidence in the data. Some of the more common qualifiers and their meanings are as follows (EPA, 1989a):

- U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.
- J - Value is estimated and probably below the contract-required quantitation limit.
- R - Quality control indicates that the data are unusable (chemical may or may not be present).
- B - Concentration of chemical in sample is not sufficiently higher than concentration in the blank (using the “5-times, 10-times” rule).

"J"-qualified data are used in the risk assessment; "R"- and "B"-qualified data are not. The handling of "U"-qualified data (nondetects) is described in the following sections.

2.2.2 Descriptive Statistical Calculations

Because of the uncertainty associated with characterizing contamination in environmental media, both the mean and the 95 percent upper confidence limit (UCL) of the mean are usually estimated for chemicals of interest. The EPA ProUCL software (Version 4.00.05 [EPA, 2010]) was used to calculate UCLs for the data sets of all environmental media represented by at least five samples. If the data set consisted of fewer than five data points, the maximum detected concentration (MDC) was selected as the exposure point concentration (EPC). One-half the reporting limit was used as the ProUCL input concentration for nondetects.

ProUCL generates a variety of UCL estimates for each data set. Generally, the results of one or two (sometimes more) of the UCL estimates are recommended. This recommendation is based

on a variety of factors, including the distribution (i.e., normal, lognormal, gamma, or not discernable) that provides the best fit, number of nondetects, size of the data set, and skewness. In general, the UCL recommended by ProUCL will be selected as the EPC. Occasionally, ProUCL will recommend the 97.5 or 99 percent UCL on the arithmetic mean estimated by the Chebyshev method. In these cases, the 95 percent UCL estimated by the Chebyshev method was selected as the EPC because this is more consistent with the intent of the reasonable maximum exposure paradigm as defined by EPA (1989a; 2002).

Analytical data from field duplicates were joined with parent sample results to yield one result for use in the generation of mean and UCL concentrations, as follows:

- The average of field duplicate and parent sample was used if both were positive detections or if both were nondetects.
- The detected value was used if one sample was a positive detection and the other was nondetect.

The UCL generated by ProUCL or the MDC, whichever is smaller, was selected as the EPC, and this value is understood to represent a conservative estimate of average for use in the risk assessment. Unusually high detected values were retained in the calculation of the UCL concentration. Inclusion of these high values increases the statistical variability and the overall conservativeness of the risk estimate.

2.2.3 COPEC Selection Criteria

The criteria used to identify COPECs in the SLERA are described in the following sections.

2.2.3.1 Comparison to Ecological Screening Values

MDCs of chemicals detected in various media were compared with ecological screening values (ESV) for ecological endpoints following recommendations received from OEPA and as discussed in *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Bulletin No. 1* (EPA, 1996). Chemicals that exceed the ESVs, or for which no ESVs are available, were retained as COPECs if other COPEC selection criteria were also met. The following ESVs, or ESV hierarchy (as noted), were used for the ecological evaluation:

- ***Soil.*** Soil screening values were selected using the following hierarchy: (1) EPA ecological soil screening levels (EPA, 2008), (2) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et. al., 1997a), (3) EPA Region 5 ecological screening levels (note: these values were previously known as ecological data quality levels) (EPA, 2003), (4) *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic*

Process (Efroymson, et al., 1997b), and (5) *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants* (Efroymson, et al., 1997c). It should be noted that effects on heterotrophic processes may not be relevant to ecological receptors of concern at the site.

- ***Surface Water.*** The lowest surface water screening value was selected from the following three sources: (1) OEPA Water Quality Criteria (OAC Chapter 3745-1) for the protection of aquatic life, (2) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et al., 1997a), and (3) EPA Region 5 ecological screening levels (EPA, 2003). Because OEPA water quality criteria do not consider food-chain effects, a hierarchy could potentially eliminate important surface water COPECs.

- ***Sediment.*** Sediment screening values were selected using the following hierarchy: (1) Consensus-based threshold effect concentration values (MacDonald, et al., 2000), (2) EPA Region 5 ecological screening levels (EPA, 2003), (4) *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson, et al., 1997a), and (5) *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* (Ontario Ministry of the Environment and Energy, 1993).

The development of the ESVs used for the PBOW SLERAs is presented in Appendix B.

2.2.3.2 Frequency of Detection

Chemicals that are detected infrequently may be artifacts in the data that may not reflect site-related activity or disposal practices. These chemicals are not evaluated further in the risk evaluation. Generally, chemicals that are detected only at low concentrations in less than 5 percent of the samples from a given medium are dropped from further consideration, unless their presence is expected based on historical information about the site. Chemicals detected infrequently at elevated concentrations as compared with applicable risk-based thresholds may identify the existence of "hot spots" and have been retained in the evaluation, unless other information exists to suggest that their presence is unlikely to be related to site activities.

2.2.3.3 Background Evaluation

Chemical concentrations were compared to site-specific background concentrations (see next paragraph for details) as an indication of whether a chemical is present from site-related activity or as natural background. This comparison is generally valid for inorganic chemicals but not for organic chemicals, because inorganic chemicals are naturally occurring and most organic chemicals are not. Statistical techniques are used as tools to aid the exercise of professional judgment in resolving site-related issues for metals, because metals are naturally present in most environmental media. The statistical techniques generally involve comparing the site data with background data. Background data are only available for soil at PBOW. For this SLERA, background soil values were also compared to concentrations detected in sediment samples at

AP3. The drainage ditch flowing to the west from AP3 only contains water intermittently, and this ditch bed is also likely to be predominantly composed of surface soil. Background data do not exist for surface water; therefore, a statistical background evaluation for this medium cannot be performed.

The first statistical technique used for the background screen is the comparison of the MDC of the site data set to the PBOW background screening concentration (BSC). BSCs are considered representative concentrations of naturally occurring inorganic constituents; therefore, a comparison between the BSC and concentrations detected on site provides an indication of whether exposure to on-site media exceeds ambient levels. The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998). It is noted that the method agreed upon for the development of BSCs, as recorded in the September 11, 2002 PBOW Team Meeting minutes, differs from that shown in current OEPA (2004) guidance. This PBOW Team agreement, which has been used for all PBOW risk assessments to date, takes precedence over the subsequent OEPA (2004) guidance. The background soil samples were collected from near the property boundary, away from any potential source areas. BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC of the concentrations found in these background soil samples or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (Shaw, 2005). The upper tolerance limit is the concentration, with a probability of 0.95 (or a confidence of 95 percent), that would capture (or cover) 95 percent of background samples if a larger number of samples were collected. Chemicals with MDCs less than their respective BSCs are eliminated from further consideration. If the MDC exceeds the BSC, the chemical may be retained as a COPEC, or a different statistical analysis may be performed to determine if the background data and the site data are drawn from the same population. The Wilcoxon Rank Sum (WRS) test is used for this purpose.

The WRS test (also known as the Mann-Whitney U test) is described in Appendix M of Shaw (2005). WRS testing is performed for inorganic chemicals in soil whose MDCs exceed their respective BSCs and when the site and background data sets each contain less than 50 percent nondetects. The WRS test is not performed on data sets containing 50 percent or more nondetects, because the medians of such data sets are unknown and the test lacks sufficient power to yield reliable results. Likewise, the WRS test is not performed on data sets of size $n < 5$; in such cases, the test lacks sufficient power to identify differences between the two samples. Site data sets are interpreted as being significantly different from PBOW background if the associated p-level is less than 0.05. WRS statistical output and box and whisker plots of the various inorganic COPEC data sets are appended to the SLERA for each inorganic data set evaluated against the site

background data set. Analytes shown by the WRS results to exceed background (or for which the WRS testing was not run) are assumed to be site related and retained as COPECs, unless a qualitative chemical-specific explanation is presented in the uncertainties analysis as to why the analyte should not be regarded as site related. Analytes shown by the WRS results to be drawn from the same population as the background samples are assumed to be naturally occurring and are not retained as COPECs. The WRS test was performed for arsenic, copper, mercury, and selenium in soil for AP3. The WRS test was not used to compare sediment to soil concentrations. For all four metals evaluated, on-site concentrations were found not to be significantly different from background at the $p = 0.05$ confidence level. Therefore, arsenic, copper, mercury, and selenium were eliminated as COPECs in soil. Supporting information for the WRS test, including box-and-whisker plots, is presented in Appendix C.

Chemicals that fail the background evaluation are assumed to be site related and are not eliminated at this point of the screening process.

2.2.3.4 Essential Nutrients

Evaluating essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required nutrients. Essential nutrients such as calcium, iron, magnesium, potassium, and sodium are usually eliminated as COPECs because they are generally considered to be innocuous in environmental media. Other essential nutrients, including chloride, iodine, and phosphorus, may be eliminated as COPECs, provided that their presence in a particular medium is shown to be unlikely to cause adverse effects to biological health.

2.2.4 Summary of COPEC Selection

The results of the COPEC screening are presented in Tables 2-8 through 2-10 for soil, surface water, and sediment. The tables present the following information for each medium:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of detection limits
- Arithmetic mean (average) of site concentrations
- Distribution type
- UCL of the mean of the concentration (only for chemicals selected as COPECs)
- Appropriate ESV
- BSC
- COPEC selection conclusion: NO (with rationale for exclusion), or YES (selected).

The selected EPC is also presented for each chemical identified as a COPEC. For soil, two EPC results are presented, including a total soil EPC that represents concentrations in the 0-6 feet bgs depth range, and a surface soil EPC that represents concentrations in the 0-1 foot bgs depth range. These two sets of EPCs are used to evaluate various ecological receptors that may be exposed to different soil depths associated with their various life-history characteristics (Section 3.1). Footnotes in each table provide the rationale for selecting or rejecting a chemical as a COPEC. In some situations, it is appropriate to reinstate as COPECs chemicals that have been eliminated using one or more of the screening criteria. Examples of these exceptions include potential breakdown products, chemicals known to have been used on site historically, chemicals with detection limits greater than the ESV, and chemicals with high bioconcentration and/or bioaccumulation factors. A qualitative evaluation of the COPEC tables for soil, surface water, and sediment was performed; based on this evaluation, no additional COPECs are recommended.

Three chemicals were selected as COPECs in soil (Table 2-8), one was selected in surface water (Table 2-9), and four were selected in sediment (Table 2-10). As discussed at the beginning of Chapter 2.0, the SLERA null hypotheses are that potential for adverse ecological effects are minimal or nonexistent due to the lack of viable habitat, potential ecological receptors, potential exposure pathways, and/or potential chemical stressors. Given the selection of COPECs in multiple media, and the finding that viable habitat, potential receptors, and potential exposure pathways exist at the site, a predictive assessment is triggered for AP3. Chemicals not eliminated using the screening procedures previously presented are considered COPECs and are quantitatively evaluated in the predictive SLERA.

2.3 Ecological Endpoint (Assessment and Measurement) Identification

The first step in a predictive SLERA is the identification of assessment and measurement endpoints. The protection of ecological resources, such as habitats and species of plants and animals, is a principal motivation for conducting the SLERA. Key aspects of ecological protection are presented as policy goals. These are general goals established by legislation or agency policy that are based on societal concern for the protection of certain environmental resources. For example, environmental protection is mandated by a variety of legislation and government agency policies (e.g., the Comprehensive Environmental Response, Compensation, and Liability Act and the National Environmental Policy Act). Other legislation includes the Endangered Species Act (16 U.S.Code 1531-1544) (1993, as amended) and the Migratory Bird Treaty Act 16 (U.S. Code 703-711) (1993, as amended). To determine whether these protection goals are met at the site, assessment and measurement endpoints have been formulated to define the specific ecological values to be protected and to define the degree to which each may be protected.

Unlike the human health risk assessment process, which focuses on individual receptors, the SLERA focuses on populations or groups of interbreeding nonhuman, nondomesticated receptors. This is accomplished by selecting measurement endpoints (discussed below) that are related to parameters most likely to result in population-level effects (e.g., survival, growth, or reproduction) and consideration of lowest-observed-adverse-effect levels (LOAEL) in addition to no-observed-adverse-effect level (NOAEL) endpoints (Chapter 4.0). In the SLERA process, risks to individual receptors are assessed only if they are protected under the Endangered Species Act, are species that are candidates for protection, or are species of special concern.

Given the diversity of the biological world and the multiple values placed on it by society, there is no universally applicable list of assessment endpoints. Suggested criteria that may be considered in selecting assessment endpoints suitable for a specific ecological risk assessment are (1) ecological relevance, (2) susceptibility to the contaminant(s), (3) accessibility to prediction and/or measurement, and (4) definability in clear, operational terms (Suter, 1993). Selected assessment endpoints reflect environmental values that are protected by law, are critical resources, or have relevance to ecological functions that may be impaired. Both the entity and attribute are identified for each assessment endpoint.

Assessment endpoints are inferred from effects to one or more measurement endpoints. The measurement endpoint is a measurable response to a stressor that is related to the valued attribute of the chosen assessment endpoint. It serves as a surrogate attribute of the ecological entity of interest (or of a closely related ecological entity) that can be used to draw a predictive conclusion about the potential for effects to the assessment endpoint.

Measurement endpoints for this SLERA are based on toxicity values from the available literature and not statistical or arithmetic summaries of actual field or laboratory observations or measurements. When possible, receptors and endpoints have been concurrently selected by identifying those that are known to be adversely affected by chemicals at the site based on published literature. COPECs for those receptors and endpoints have been identified by drawing on the scientific literature to obtain information regarding potential toxic effects of site chemicals to site species. This process ensures that a conservative approach is taken in selecting endpoints and evaluating receptors that are likely to be adversely affected by the potentially most toxic chemicals at the site.

2.3.1 Assessment Endpoints

The assessment endpoints for AP3 are stated as "the protection of long-term survival and reproductive capabilities for terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals." The corresponding null hypothesis for each of the assessment endpoints is stated as "the presence of site contaminants within soil, surface water, sediment, vegetation, and prey will have no effect on the survival or reproductive capabilities of terrestrial invertebrates, herbivorous mammals, omnivorous mammals, insectivorous mammals and birds, carnivorous birds, benthic invertebrates, and omnivorous aquatic mammals."

Assessment receptor species were selected based on the likelihood of finding the species at AP3. Historical information, the site reconnaissance visits, and the availability of toxicological data were used to select terrestrial and aquatic assessment receptor species. These receptors species are depicted in food web models (Figures 2-4 and 2-5). Food web models are simplified versions of the possible movement of contaminants through the food chain present or potentially present at the site. Due to lack of data for all possible species, key species have been selected to represent broad classes, or guilds.

The food web conceptual site models were developed to illustrate how the selected terrestrial and aquatic species are ecologically linked within food webs. One species was used to represent each of the major trophic levels and habitats at the site. The decision was made not to complicate the food web models with species names for organisms at the base of the food web (e.g., species names of terrestrial invertebrates). Thus, generic terrestrial invertebrates, benthic invertebrates, and aquatic invertebrates were used to represent the bottom of the food chain. For terrestrial invertebrates and plants, partitioning coefficients and simple empirical uptake models were employed to estimate COPEC concentrations within tissues (Chapter 3.0). Brief life history descriptions for the selected receptor species are provided in Appendix D.

All trophic levels may be exposed to COPECs, either by direct exposure to contaminated abiotic media or through ingestion of lower trophic level food items. Primary producers (plants) absorb COPECs (as well as nutrients) from soil and/or water. Through abiotic processes, COPECs can adsorb to the sediment and detritus particles. When these particles settle and become part of the benthic substrate, they may also become a source of COPECs to benthic communities. Various species of aquatic biota fulfill the role of aquatic herbivores (feeding on aquatic plants and suspended detritus) and predatory invertebrates (feeding on benthic invertebrate species). The combination of COPEC bioconcentration from water, ingestion of contaminated prey, and restricted ranges for aquatic organisms provides good conditions for significant bioaccumulation

of COPECs. In terrestrial species, bioconcentration occurs in plants and invertebrates, and higher food chain receptors bioaccumulate COPECs through the ingestion of food items.

2.3.2 Measurement Endpoints

Measurement endpoints are frequently numerical expressions of observations (e.g., toxicity test results or community diversity indices) that can be compared statistically to detect adverse responses to a site contaminant. Examples of typical measurement endpoints include mortality, growth, or reproduction parameters in toxicity tests; individual abundance; and species diversity (EPA, 1997).

For assessments, measurable responses to stressors may include LOAELs, NOAELs, lethal concentration to 50 percent of the test population, lethal dose to 50 percent of the test population, or effective concentration for 20 percent of the test population, collectively termed toxicity reference values (TRV) (see Section 4.1 for further explanation).

2.4 Selection of Assessment Receptors

In order to focus the exposure characterization portion of the SLERA on species or components that are the most likely to be affected and on those that, if affected, are most likely to result in significant impacts to the on-site ecosystem, the selection of assessment receptors focuses on species, groups of species, or functional groups that are directly related to the assessment endpoints previously identified (Section 2.3.1).

Site biota were organized into major functional groups. For terrestrial communities, the major groups are plants and wildlife, including terrestrial invertebrates, mammals, and birds. For aquatic and/or wetland communities, the major groups are flora and fauna, including vertebrates (water fowl and fish), aquatic invertebrates, and wetland/terrestrial mammals. Species presence and relative abundance were partly determined during the site reconnaissance.

Primary criteria for selecting appropriate assessment receptors include, but are not limited to, the following:

- The assessment receptor has a relatively high likelihood of contacting chemicals via direct or indirect exposure.
- The assessment receptor exhibits marked sensitivity to chemicals.
- The assessment receptor is a key component of ecosystem structure or function (e.g., importance in the food web, ecological relevance).

- The assessment receptor may be listed as rare, threatened, or endangered by a governmental organization, or the receptor consists of critical habitat for rare, threatened, or endangered species.

Additional criteria for selection of assessment receptors were used to identify species that offer the most favorable combination of characteristics for determining the implications of on-site contaminants. These criteria included (1) limited home range, (2) role in local nonhuman food chains, (3) potential high abundance and wide distribution at the site, (4) sufficient toxicological information available in the literature for comparative and interpretive purposes, (5) sensitivity to COPECs, (6) relatively high likelihood of occurrence on site following remediation (if required), (7) suitability for long-term monitoring, (8) importance to the stability of the ecological food chain or biotic community of concern, and (9) relatively high likelihood that species will be present at the site or that habitats present at the site could support the species. Assessment receptors are representative species that are modeled for exposure to contaminants via multiple exposure routes. Organisms at the base of the food chain (i.e., plants, invertebrates, etc.) are not evaluated for food chain effects because direct exposure is the primary exposure route of concern for these organisms, which is evaluated by the ecological benchmark comparison during the initial COPEC screening process. Therefore, these types of organisms are not selected as assessment receptors.

AP3 is characterized by an ash pit area in a depression with shrub/scrub cover and successional forest adjacent to the depression. Water is occasionally present in the depression, but the depression becomes completely dry during times of low rainfall. A drainage channel that typically contains water only following storm events is present to the west of the ash pit.

2.4.1 Terrestrial Receptors

Seven representative terrestrial receptor species that are expected or possible in the area of AP3 (based on the ecological description of the site presented in Section 2.1) were selected as indicator species for the potential effects of COPECs. These indicator species represent two classes of vertebrate wildlife (mammals and birds) and a range of both body size and food habits and include herbivores, omnivores, and carnivores. Vegetation is not considered an assessment receptor. The seven terrestrial species selected include the deer mouse (*Peromyscus maniculatus*) (small, omnivorous mammal), short-tailed shrew (*Blarina brevicauda*) (small, insectivorous mammal), Eastern cottontail rabbit (*Sylvilagus floridanus*) (medium-sized herbivorous mammal), marsh wren (*Cistothorus palustris*) (small insectivorous bird), white-tailed deer (*Odocoileus virginianus*) (large herbivorous mammal), raccoon (*Procyon lotor*) (medium-sized omnivorous mammal), and red-tailed hawk (*Buteo jamaicensis*) (large, carnivorous bird).

A terrestrial food web for the ash pit is presented on Figure 2-4. Many of the species evaluated have limited home ranges, particularly the deer mouse, cottontail rabbit, short-tailed shrew, and marsh wren, which make them particularly vulnerable to exposure from site contaminants. All of the selected terrestrial receptor species have a potentially high abundance and wide distribution at the site; also, sufficient toxicological information (with the exception of some bird species) is available in the literature for comparative and interpretive purposes. All species are considered important to the stability of the local ecological food chain and biotic community. Finally, all the selected species have readily available exposure data, as summarized in the *Wildlife Exposure Factors Handbook* (EPA, 1993).

Larger mammal species were generally not selected as sensitive receptors due to their large home ranges; however, the red-tailed hawk was retained due to its unique role as a top predator in the food chain and the white-tailed deer was retained due to its high abundance at the site. Smaller birds were generally not included because most are migratory. The red-tailed hawk was also identified as a surrogate for the state-threatened bald eagle at AP3. The potential risk to species with larger home ranges and migratory avian species are included within the predicted risks to the selected terrestrial indicator receptors. Area use factors (AUF) were set to 100 percent for the mouse, shrew, rabbit, and wren, due to their relatively small home ranges (Section 3.1). However, for the deer, hawk, and raccoon, the AUF was set at 0.002, 0.001, and 0.005 (or 0.2, 0.1, and 0.5 percent), respectively, based on these species' relatively large home ranges (518, 842, and 156 hectares, or 1,280, 2,081, and 385 acres, respectively), compared with the size of the site being evaluated (approximately 1.5 acres for AP3 [Figure 1-2]).

Results of the assessment receptor selection process are presented in detailed biological and ecological descriptions called assessment receptor profiles (ARP). The biologically relevant criteria used to select the seven terrestrial assessment receptors are also discussed and summarized in the ARPs (Appendix D).

2.4.2 Aquatic Receptors

The aquatic habitat at AP3 consists of the small depression and drainage channel at AP3, both of which contain water only intermittently throughout the year (Photos 2 through 7 on Figure 2-1). Therefore, very limited aquatic habitat is present at AP3. Exposure to aquatic organisms is assumed to occur via direct exposure to contaminants in the water column, ingestion of surface water (via drinking and as a result of bioconcentration through direct contact) and sediment (while foraging, preening, etc.), and ingestion of food items (i.e., plants, benthic invertebrates, and prey) exposed to contaminants in surface water and sediment. Potential uptake through the

aquatic food chain is evaluated for the raccoon (also considered as a terrestrial receptor). The muskrat (*Ondatra zibethicus*) (medium-sized aquatic herbivorous mammal) is also evaluated. The evaluation of a muskrat at AP3 is extremely conservative because water is not always present in the depression area or the drainage channel at AP3, and when it is present the pooled areas do not have the sufficient depth or water velocity necessary to avoid freezing in the winter, which is a requirement for muskrat inhabitation. An avian aquatic omnivore such as the mallard (*Anas platyrhynchos*) is not evaluated because pooled water of sufficient depth to attract dabbling ducks is not present at the site.

Aquatic organisms represent some of the prey base for aquatic receptors, represented by the raccoon and muskrat. An aquatic food web is presented on Figure 2-5. The raccoon is a likely visitor to the site (Section 2.1) and has a potentially high abundance and wide distribution in the area, and sufficient toxicological information is available in the literature for comparative and interpretive purposes. The muskrat is also likely to be found at PBOW (Table 2-2). As mentioned previously, the aquatic habitat is likely too limited to support muskrat populations at AP3; however, this receptor is conservatively included in the evaluation to represent mammalian aquatic herbivores. Both the raccoon and muskrat have readily available exposure data, as summarized in the *Wildlife Exposure Factors Handbook* (EPA, 1993).

Results of the assessment receptor selection process, including a summary of the relevant biological criteria used, are presented in the ARPs (Appendix D).

2.5 Ecological Site Conceptual Model

Pictorial representations of the evaluated food webs are presented on Figures 2-4 and 2-5. The accompanying text presented in Section 3.1 is intended to clarify the ecological site conceptual models (ESCM). The ESCMs trace the contaminant pathways through both abiotic components and biotic food web components of the environment. The ESCMs present all potentially complete exposure pathways. The ESCMs have been used as a tool for judging the appropriateness and usefulness of the selected measurement endpoints in evaluating the assessment endpoints and for identifying sources of uncertainty in the exposure characterization.

3.0 Exposure Characterization

An estimate of the nature, extent, and magnitude of potential exposure of assessment receptors to COPECs that are present at or migrating from the site is presented in this section, considering both current and reasonably plausible future use of the site. Exposure characterization is critical in further evaluating the risk of chemicals identified as COPECs during the screening process (Section 2.2). The exposure assessment has been conducted by linking the magnitude (concentration) and distribution (locations) of the contaminants detected in the media sampled during the investigation, evaluating pathways by which chemicals may be transported through the environment, and determining the points at which organisms found in the study areas may contact contaminants.

3.1 Exposure Analysis

An exposure analysis combining the spatial and temporal distribution of the ecological receptors with those of the COPECs was performed to evaluate exposure. The exposure analysis focuses on the bioavailable chemicals and the means by which the ecological receptors are exposed (e.g., exposure pathways). The focus of the analysis is dependent on the assessment receptors being evaluated as well as the assessment and measurement endpoints.

Exposure pathways consist of four primary components: source and mechanism of contaminant release, transport medium, potential receptors, and exposure route. A chemical may also be transferred between several intermediate media before reaching the potential receptor. All of these components have been addressed within the SLERA. If any of these components is not complete, then contaminants in the affected media do not constitute an environmental risk at the site. The major fate and transport properties associated with typical site contaminants are described in subsequent sections. These properties directly affect a contaminant's behavior in each of the exposure pathway components.

Ecological routes of exposure for biota may be direct (bioconcentration) or through the food web via the consumption of contaminated organisms (biomagnification). Direct exposure routes include dermal contact, absorption, inhalation, and ingestion. Examples of direct exposure include animals incidentally ingesting contaminated soil or sediment (e.g., during burrowing or dust-bathing activities), animals ingesting surface water, plants absorbing contaminants by uptake from contaminated sediment or soil, and the dermal contact of aquatic organisms with contaminated surface water or sediment. Given the scarcity of available data for wildlife dermal and inhalation exposure pathways, potential risk from these pathways is not estimated in this

SLERA. In addition, these pathways are generally considered to be incidental for most species, with the possible exceptions of burrowing animals and dust-bathing birds.

Food web exposure can occur when terrestrial or aquatic fauna consume contaminated biota. Examples of food web exposure include animals at higher trophic levels consuming plants or animals that bioaccumulate contaminants.

Bioavailability is an important contaminant characteristic that influences the degree of chemical-receptor interaction. The bioavailability of a chemical refers to the degree to which a receptor is able to absorb a chemical from the environmental medium. A chemical's bioavailability is a function of several physical and chemical factors such as grain size, organic carbon content, water hardness, and pH.

Daily doses of COPECs for vertebrate receptors were calculated using standard exposure algorithms. These algorithms incorporate species-specific natural history parameters (i.e., feeding rates, water ingestion rates, dietary composition, etc.) and also use site-specific AUFs, as follows:

$$Total\ Daily\ Dose = \left(\frac{\left(\left[Soil_j * IR_{soil} \right] + \left[Water_j * IR_{water} \right] + \left[\sum_{i=1}^{N} B_{ji} * P_i * IR_{food} \right] \right)}{Body\ Weight} \right) * AUF \qquad \text{Eq. 3.1}$$

where:

$Soil_j$	=	Concentration of COPEC "j" in soil
$Water_j$	=	Concentration of COPEC "j" in surface water
B_{ji}	=	Concentration of COPEC "j" in food type "i"
IR_{soil}	=	Soil ingestion rate
IR_{water}	=	Surface water ingestion rate
IR_{food}	=	Food ingestion rate
P_i	=	Proportion of food $type_i$ in receptor diet
AUF	=	Area use factor (equal to area of exposure unit/home range of receptor)
Body Weight	=	Body weight of receptor.

Sediment may replace soil in Equation 3.1 for aquatic or semiaquatic receptors.

The first step in estimating exposure rates for terrestrial wildlife involves the calculation of feeding and drinking rates for site receptors. EPA (1993) includes a variety of exposure information for a number of avian, herptile, and mammalian species. Information regarding

feeding and drinking rates and dietary composition are available for many species or may be estimated using allometric equations (Nagy, 1987). Data have also been gathered on incidental ingestion of soil and incorporated for the receptor species. Literature values for animal-specific sediment ingestion are used if available. However, such values generally are not available in the literature. Where sediment ingestion rates could not be found, the animal-specific incidental soil ingestion rate is used for sediment ingestion as well, if the receptor's life history profile suggests a significant aquatic component (e.g., raccoons' use of surface water in foraging activities). This information is summarized in Table 3-1.

To estimate dose associated with ingested food items, concentrations of COPECs in the vegetation or prey in the species' diet is estimated using bioaccumulation factors (BAF) (sometimes referred to as bioconcentration factors). BAFs are regression models or scalar variables that reflect the potential for the COPECs to be present in food items at concentrations different from (usually greater than) the ambient environment. Differences in concentration are due to chemical-specific properties of the COPEC that affect its tendency to bioaccumulate in tissue, balanced by the innate ability of the species to regulate body burden levels of the chemical via metabolic and excretory processes.

Selection of appropriate BAFs is a critical component to food chain modeling. General approaches for BAF selection have been discussed in Sample and Suter (1994), EPA (1999a), U.S. Army Environmental Center (2005) and EPA (2008). An approach that is consistent with these sources was followed in the selection of BAFs for PBOW. The general hierarchy for selection of BAFs based on types of sources is as follows:

1. Use of regression equations derived from paired field- or laboratory-based measurements

2. Ratio-derived BAFs developed based on paired data of tissue concentrations compared to media concentrations where the BAF is equal to the tissue concentration divided by the concentration in the abiotic medium.

3. Modeled equilibrium partitioning-derived BAFs based on physical or chemical characteristics

4. Assumptions based on values common to chemical class.

Both U.S. Army Environmental Center (2005) and EPA (1999a) support the use of ratio BAFs in preference to equilibrium partitioning-based BAFs, which are typically calculated based on

factors such as log octanol-water partition coefficient (K_{ow}) values, fraction of organic carbon in soil, or percent of lipids in invertebrates.

Other general recommendations provided in EPA (2008) were also followed, including the following:

- For selection of ratio-based BAFs, median values are selected over maximum or other high-end BAFs.
- BAFs for accumulation of polynuclear aromatic hydrocarbons (PAH) into mammalian prey are assumed to equal zero due to the high metabolic breakdown of PAHs in mammals.

Regression equations used to calculate prey tissue concentrations of a specific chemical typically take the following general equation form:

$$\text{Ln}\ (C_{food}) = \text{slope value x ln}\ (C_{abiotic_media}) + \text{intercept value} \qquad \text{Eq. 3.2}$$

where:

C_{food}	=	Concentration of chemical in food type
$C_{abiotic_media}$	=	Concentration of chemical in abiotic media.

Ratio BAFs can be generally presented as follows:

$$C_{food} = \text{BAF x}\ (C_{abiotic_media}) \qquad \text{Eq. 3.3}$$

where:

C_{food}	=	Concentration of chemical in food type
$C_{abiotic_media}$	=	Concentration of chemical in abiotic media
BAF	=	Constant.

BAFs calculated based on equilibrium partitioning typically use a physical constant of a chemical to generate a BAF. A generalized form for this calculation would be as follows:

$$\text{Log (BAF)} = \text{slope value x Log}\ (K_{ow}) + \text{intercept value} \qquad \text{Eq. 3.4}$$

where:

Log (BAF)	=	Log of the BAF for chemical in food type

BAFs calculated based on equilibrium partitioning are applied in the same fashion as ratio-based BAFs to generate a tissue concentration value. Any K_{ow} values needed for BAFs based on equilibrium partitioning are obtained from EPA's Estimation Program Interface Suite K_{ow}Win software program (available on-line).

Finally, where ratio-based BAFs are missing and where no equilibrium partitioning method has been developed for calculating BAFs, other methods, such as using BAFs for chemicals in the same class as surrogates, may be presented for establishing ratio-based BAFs.

For the current SLERA, PBOW-specific BAFs that were developed as part of the Red Water Ponds Phase II baseline ecological risk assessment (BERA) (IT, 2001b) were used for the AP3 food chain model, when available. Site-specific soil-to-earthworm and sediment-to-benthic invertebrate BAFs were developed in the Phase II BERA based on 28-day bioaccumulation studies performed using the earthworm species *Eisenia foetida* or the invertebrate species *Lumbriculus variegates,* respectively, and soil or sediment samples collected from the PBOW Red Water Ponds area. Both reasonable maximum exposure (RME) and central tendency (CT) BAFs were estimated in the Red Water Ponds risk assessment. The RME BAFs were based on all tissue concentration results, even if blank related, and the CT BAFs were based on blank-corrected tissue results. Although EPA recommends that median values be selected over maximum or other high-end BAFs, the RME sediment-to-aquatic invertebrate and soil-to-worm BAFs were conservatively selected over the CT BAFs as the selected BAFs for the AP3 SLERA, when available. The Red Water Ponds BERA also developed CT and RME BAFs for surface water to fish for two different PBOW sites, the West Area Red Water Ponds and Pentolite Road (IT, 2001b). These values were also adopted for use in the AP3 SLERA. When two values were available for a given chemical from the two areas, the average of the RME values was used as the BAF for the AP3 SLERA.

The hierarchies used to select BAFs specific to the various types of biota are presented below. Chemical-specific BAFs (or the regression equation used to calculate COPEC concentrations) for COPECs selected using the respective hierarchies are presented in Tables 3-2 through 3-6.

Table 3-2 presents the soil-to-plants BAFs for COPECs at AP3. Soil-to-plants BAFs are also used to evaluate sediment-to-plant uptake at PBOW. Soil-to-plants BAFs are selected using the following specific hierarchy of sources:

1. EPA (2008) selected regressions
2. Efroymson, et al. (2001) regressions

3. EPA (2008) recommended median BAFs
4. International Atomic Energy Agency (IAEA) (1994) BAFs
5. Baes, et al. (1984) BAFs (these values were often updated in the more recent IAEA [1994] publication).

Table 3-3 presents the soil-to-invertebrates (earthworms) BAFs for COPECs at AP3. Soil-to-invertebrates BAFs are selected using the following hierarchy of sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (2008) selected regressions
3. Sample, et al. (1998a) regressions
4. Sample, et al. (1998a) median BAFs
5. Equilibrium BAF calculation method in EPA (2008) based on Jager (1998).

Table 3-4 presents the soil-to-mammals BAFs for COPECs at AP3. Soil-to-mammals BAFs are selected using the following hierarchy or sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (2008) or Sample, et al. (1998b) selected regressions
3. EPA (2008) referenced BAFs (Note: Per EPA [2008], a BAF of zero is used for all PAHs, TNT, and RDX.)
4. Sample, et al. (1998b) median BAFs
5. IAEA (1994) BAFs
6. Baes, et al. (1984) BAFs (These values were often updated in the newer IAEA [1994] publication.)
7. EPA (1999b) maximum calculated BAFs/bioconcentration factors for feeding guilds.

Table 3-5 presents the sediment-to-aquatic invertebrates BAFs for COPECs at AP3. Sediment-to-aquatic invertebrates BAFs are selected using the following hierarchy of sources:

1. PBOW site-specific BAFs (IT, 2001b)
2. Ratio BAFs from Bechtel Jacobs Company, LLC (1998)
3. Ratio BAFs from EPA (1999b)
4. Ratio BAFs from other literature sources
5. Conservative default based on median BAF for polychlorinated biphenyls from Bechtel-Jacobs Corporation, LLC (1998).

Table 3-6 presents the surface water-to-fish BAFs for COPECs at AP3. Surface water-to-fish BAFs are selected using the following hierarchy:

1. PBOW site-specific BAFs (IT, 2001b)
2. EPA (1999b) ratio BAFs
3. EPA (1989b) ratio BAFs

4. Risk Assessment Information System database (Oak Ridge National Laboratory, 2008, on-line)
5. Equilibrium partitioning equation (Bintein and Devillers, 1993).

It should be noted that the BAFs presented in EPA (1989a; 1999b) are presented in units of milligrams per kilogram (mg/kg) (wet) per milligrams per liter (mg/L). These BAFs were adjusted to BAFs with dry weight units of mg/kg (dry) per mg/L by dividing by the proportion of solids of a fish (20 percent, as detailed in Table C-5 of EPA [2000]).

Ingestion rates for receptor species are typically developed as a quantity of wet weight material ingested. Soil analytical data results are typically reported on a dry weight basis. Literature-derived BAFs are often a mixture of dry weight-to-wet weight and dry weight-to-dry weight values. To avoid underestimating or overestimating food concentrations based on confusion over dry weight versus wet weight, final food concentrations are adjusted in the SLERA to report concentrations on a dry weight basis. Although it was not necessary to convert food intake rates from wet weight to dry weight in this SLERA, the moisture contents of the invertebrate and vegetative material in the receptor species' diets from the EPA's *Wildlife Exposure Factors Handbook* (EPA, 1993) can be used for this conversion, as follows:

- Earthworms - 84 percent
- Fruit - 77 percent
- Roots/young grass - 82 percent
- Seeds - 9.3 percent
- Fruit/young grass - 78 percent.

Exposure to four categories of environmental media are addressed in the SLERA, as discussed in the following subsections.

Soil Exposure Pathway. Soil exposure pathways are potentially important for terrestrial plants and animals at the site. For nonburrowing animals, exposure to soil from a depth of 0 to 1 foot bgs is typically considered appropriate, as this soil depth would represent the depth of regular exposure. However, this exposure depth was extended for a few soil samples at AP3 (AP0039 and AP0043 [Table 2-7]) that had sampling intervals primarily in the 0 to 1 foot bgs range, but end depths that approached 2 feet bgs. For burrowing animals such as the shrew, exposure to soil from a depth of 0 to 6 feet bgs was considered. It is noted that although the shrew itself may not actually burrow to a depth of 6 feet, there may be other burrowing mammals that do burrow this deep. For plants and herbivores feeding on deep-rooted plants (e.g., the white-tailed deer, which is assumed to ingest leaves of trees translocating COPECs from subsoils), exposure to soil from a depth of 0 to 6 feet bgs (or the water table surface) was also

evaluated because most feeder roots for vegetation that may be ingested by the white-tailed deer are located within this depth. Thus, the shrew and the white-tailed deer (Figure 2-4), were evaluated for exposure to deeper (0 to 6 feet bgs) soil. All other receptors exposed to soil were evaluated for exposure to concentrations in surface (0 to 1 foot bgs, extended to 2 feet bgs for a few samples, as noted previously) soil.

Environmental conditions such as soil moisture, soil pH, and cation exchange capacities significantly influence whether potential soil contaminants remain chemically bound in the soil matrix or can be chemically mobilized (in a bioavailable form) and released for plant absorption. Generally, neutral to alkaline soils (soil pH of 6.5 or greater) restrict the absorption of toxic metals, making pathway completion to plants difficult.

Sediment Exposure Pathway. Sediment consists of materials precipitated or settled out of suspension in surface water or native soils underlying flowing or standing surface water bodies. Potential contaminant sources for sediment include over-ground transport from the AP3 area and contaminated surface water, groundwater, and soil. The release mechanisms include surface water runoff, groundwater discharge, and airborne deposition. Potential receptors of chemicals in contaminated sediment include aquatic flora and fauna. Direct exposure routes for contaminated sediment include contact by benthic-dwelling organisms such as amphipod invertebrates, uptake by aquatic flora, and ingestion by aquatic fauna. Indirect exposure pathways from sediment include consumption of bioaccumulated contaminants by consumers in the food chain. Chemical bioavailability of many nonpolar organic compounds (e.g., polychlorinated biphenyls and pesticides) decreases with increasing concentrations of total organic carbon in the sediment; however, these compounds can still bioaccumulate up the food chain (Landrum and Robbins, 1990).

Surface Water Exposure Pathway. Surface water represents a potential transport medium for COPECs. Potential sources for contaminated surface water include over-ground transport from the AP3 area, contaminated soil/sediment and groundwater, and deposition of airborne contaminants. The release mechanisms include surface runoff, leaching, and groundwater seepage. Potential receptors of contaminated surface water include terrestrial and aquatic fauna and aquatic flora. Exposure routes for contaminated surface water include ingestion by terrestrial fauna and uptake and absorption by aquatic flora and fauna. Consumption of bioaccumulated contaminants constitutes a potential indirect exposure pathway for faunal receptors. Chemical bioavailability of some metals and other chemicals is controlled by water hardness, pH, and total suspended solids.

Groundwater Exposure Pathway. Groundwater represents a potential transport medium for COPECs. Potential contaminant sources for groundwater include contaminated soil and buried or stored waste. The release mechanism for contaminants into groundwater is direct transfer of contaminants from waste materials to water as water passes through the materials.

Groundwater itself is not an exposure point in ecological risk assessments, although contaminant transport along the shallow groundwater pathway may be considered an exposure route to aquatic life, wetlands, and some wildlife where the groundwater discharges to surface water. In such cases, an evaluation of concentrations present in the surface water medium provides a more realistic and accurate risk scenario, because target receptors are hypothetically exposed to the concentrations they actually experience in their immediate environment and habitat. Therefore, groundwater was not directly evaluated in this SLERA. However, because the surface water samples that were obtained as part of the current environmental investigation were collected at AP3 during the wet season in May 2009 (i.e., during the time of year when groundwater discharge to the surface water features is most likely), it is probable that the data reflect any influence of groundwater discharge that may be occurring at this site. Thus, the surface water evaluation considers potential impact from contaminants that may be present in groundwater under exposure conditions in an aquatic habitat.

3.2 Exposure Characterization Summary

The estimated chemical intakes for each exposed receptor group under each exposure pathway and scenario are presented in the risk characterization spreadsheets in Appendix E. These intake estimates are combined with the COPEC toxicity values, discussed in Chapter 4.0, to derive estimates and characterize potential ecological risk. The chemical data used in the SLERA are presented in Appendix F. The uncertainties associated with the estimation of chemical intake are discussed in Section 5.2.

4.0 Ecological Effects Characterization

TRVs focusing on the growth, survival, and reproduction of species and/or populations have been developed for the AP3 SLERA. Empirical data are available for the specific receptor-endpoint combinations in some instances. Data on surrogate species and/or on endpoints other than the NOAEL and LOAEL were considered as necessary. The NOAEL is a dose of each COPEC that will produce no known adverse effects in the test species. The NOAEL was judged to be an appropriate toxicological endpoint because it would provide the greatest degree of protection to the receptor species. In addition, the LOAEL was used as a point of comparison for risk management decisions. For the red-tailed hawk assessment receptor that represents the state-threatened bald eagle, no calculation based on a LOAEL is performed, and recommendations are based solely on the more conservative NOAEL. In instances where data are unavailable for a site-associated COPEC, toxicological information for surrogate chemicals or groups of chemical was used. Safety factors were used to adjust for these differences and extrapolate risks to the site's receptors at the NOAEL and/or LOAEL endpoint. This process is described in the following paragraphs.

Toxicity information pertinent to identified receptors has been gathered for those analytes identified as COPECs. Because the measurement endpoint ranges from the NOAEL to the LOAEL, preference has been given to chronic studies, noting concentrations at which no adverse effects were observed and those for which the lowest concentrations associated with adverse effects were observed. As previously noted, where data are unavailable for the exposure of a receptor to a COPEC, data for a surrogate chemical or group of chemicals were considered for use in the SLERA.

Whenever possible, studies that use the site-specific target wildlife receptors were utilized. When studies for these species were not available, alternative species studies were used. TRVs are not applied across classes under any circumstances (e.g., a TRV for a bird species may not be used to estimate hazard for a mammal species). In instances where TRVs for multiple avian or mammalian species are supported, the TRV for the most similar species to the measurement receptor based on feeding strategy and physiological attributes were used in the SLERA.
Using the relevant toxicity information, TRVs were calculated for each of the COPECs. TRVs represent NOAELs and LOAELs with the safety factors presented in Wentsel, et al. (1996) applied to toxicity information that was derived from studies other than no-effects or lowest-effects studies (Figure 4-1).

Because NOAELs and LOAELs for the selected wildlife receptor species are based on data from test species that are usually different from the species of concern, a mathematical adjustment to the TRVs has often been performed in the past (e.g., Sample, et al. [1996]) using a power function of the ratio of body weights. This practice is often referred to as allometric scaling. Alternately, uncertainty factors have also been used to account for the differences in species' sensitivities to chemicals. However, in recent years, these practices have been discouraged by most scientific and regulatory groups. Recent reviews of these practices (e.g., EPA [2008]; Allard, et al. [2009]) have concluded that the use of allometric scaling of TRVs does not reflect a sound application of toxicological or ecological risk practices because supporting data for this practice are limited, and the ratio relationships used for the mathematical conversions were developed based on acute (rather than chronic) toxicity data. These reviews further conclude that uncertainty factors to account for inter-species differences based on an arbitrary multiplier should not be used without a scientific basis for their application (Allard, et al., 2009). Therefore, the use of toxicity data without adjustments as reported in the literature is regarded as the most technically sound approach and is adopted for this SLERA. The TRVs used for this SLERA are summarized in Tables 4-1 and 4-2 for mammals and birds, respectively.

Exposure rate TRVs provide a reference point for the comparison of toxicological effects upon exposure to a contaminant and are compared against calculated receptor doses. TRVs are not used for evaluating community-based receptors such as plants or invertebrates.

5.0 Risk Characterization

The risk characterization phase integrates information on exposure, exposure-effects relationships, and defined or presumed target populations. The result is a determination of the likelihood, severity, and characteristics of adverse effects to environmental stressors present at a site. Qualitative and semiquantitative approaches were used to estimate the likelihood of adverse effects occurring as a result of exposure of the selected site receptors to COPECs. Because potential adverse affects to terrestrial and aquatic plants and invertebrates have been qualitatively assessed during the initial COPEC screening step, the risk characterization focuses on potential impacts to assessment receptors (Section 2.3).

For the semiquantitative predictive assessment, TRVs and exposure rates have been calculated and are used to generate hazard quotients (HQ) (Wentsel, et al., 1996). HQs are calculated by summing intake doses across all exposure pathways for each chemical for a given receptor and dividing by the TRV. HQs for those chemicals that have a similar mode of toxicological action are typically summed to account for cumulative effects; however, no groups of COPECs with similar toxicity mechanisms were identified for this SLERA, and HQs for multiple chemicals were not summed. HQs are a means of estimating the potential for adverse effects to organisms at a contaminated site and for assessing the potential that toxicological effects will occur among site receptors.

5.1 Hazard Estimation for Terrestrial and Aquatic Wildlife

The hazard estimation was performed through a series of quantitative HQ calculations that compare receptor-specific exposure values with TRVs. The HQs are compared to HQ guidelines for assessing the risk posed from contaminants. HQs less than or equal to 1 represent no probable risk, HQs from 1 up to but less than 10 represent a low potential for environmental effects, HQs from 10 up to but less than 100 represent a significant potential that effects could result from greater exposure, and HQs greater than 100 represent the highest potential for expected effects (Wentsel, et al., 1996). It should be noted that OEPA considers HQs greater than 1 to be potentially significant. It should also be noted that HQs are not measured of risk, are not population-based statistics, and are not linearly scaled statistics. Therefore, an HQ above 1, even exceedingly so, does not definitively indicate that there is even one individual expressing the toxicological effect associated with a given chemical to which it was exposed (Tannenbaum, 2005; Bartell, 1996).

Table 5-1 summarizes the NOAEL- and LOAEL-based HQs for the eight evaluated assessment receptors at AP3. Only thallium at AP3 had an HQ greater than 1 for any receptor. Thallium was a COPEC in soil at AP 3 and was only detected in 3 out of 16 soil samples, 2 of which exceeded the BSC and ESV (Table 2-8). The MDC for thallium of 3 mg/kg only slightly exceeded the BSC of 1.3 mg/kg and the ESV of 1 mg/kg. The deer mouse and the short-tailed shrew were the only two receptors with HQs greater than 1, when rounded, and both HQs approximated 10 (9.5 for the deer mouse and 11.8 for the short-tailed shrew). HQs based on the LOAELs were less than 1. Because of the low frequency of detection, the marginal exceedance of screening values, and the relatively low HQs associated with the food chain modeling, ecological hazard associated with exposure to thallium is likely to be minimal. Therefore, the potential for adverse effects to ecological receptors appears to be very low at AP3. No chemicals at either site are recommended for further ecological evaluation.

5.2 Uncertainty Analysis

A number of factors contribute to the overall variability and uncertainty inherent in ecological risk assessments. Variability is due primarily to measurement error. Laboratory media analyses and receptor study design are the major sources of this kind of error. Uncertainty, on the other hand, is associated primarily with deficiency or irrelevancy of effects, exposure, or habitat data to actual ecological conditions at the site. Species physiology, feeding patterns, and nesting behavior are poorly predictable; therefore, all toxicity information derived from toxicity testing, field studies, or observation have uncertainties associated with them. Laboratory studies conducted to obtain site-specific, measured information often suffer from poor relevance to the actual exposure and uptake conditions on site (i.e., bioavailability, exposure, assimilation, etc., are generally greater under laboratory conditions as compared to field conditions). Calculating an estimated value based on a large number of assumptions is often the only alternative to the accurate, albeit costly, method of direct field or laboratory observation, measurement, or testing. Finally, habitat- or site-specific species may be misidentified if, for example, the observational assessment results are based on only one or even two brief site reconnaissance surveys. However, the three site reconnaissance visits that were performed at AP3 were considered sufficient to adequately assess the habitat present at each site and select appropriate representative receptors for the type of habitat available.

The uncertainty analysis lists:

- Many of the major assumptions made for the SLERA; the direction of bias caused by each assumption, i.e., whether the uncertainty results in an overestimate or underestimate of risk

- The likely magnitude of impact as high, medium, low, or unknown
- Where possible, a description of recommendations for minimizing the identified uncertainties if the SLERA progresses to higher level assessment phases.

The most important uncertainties associated with this SLERA are discussed in the following subsections.

Assumptions of bioavailability. The assumption that COPECs are 100 percent bioavailable is a worst-case assumption, and likely overestimates the potential for adverse effects. The duration that has lapsed since the contaminant release affects bioavailability as the contaminant becomes sequestered or transformed within the environmental media. Sequestration, transformation, and bioavailability are influenced by medium characteristics including pH, temperature, and organic carbon content.

Use of laboratory-derived or empirically estimated partitioning and transfer factors. The use of laboratory-derived or empirically estimated partitioning and transfer factors to predict COPEC concentrations in plants, invertebrates, prey species, and sediment likely overestimates potential risks. As discussed previously, the incorporation of COPECs into the food chain is influenced by the characteristics of the exposure medium, which likely differs from that used in the laboratory to derive partitioning and transfer factors.

Use of laboratory-derived toxicity reference values. TRVs were identified for all chemicals. The use of laboratory-derived TRVs may overestimate or underestimate the potential for adverse effects. The method of administration of the contaminant in the laboratory is significantly different than that experienced in the wild by the receptors.

Use of the HQ method to estimate risks to populations or communities. The calculation of HQs also introduces uncertainty. The following limitations associated with HQs (Tannenbaum, et al., 2003) are noted:

- HQs are not measures of risk.
- HQs are not population based.
- HQs are not linearly scaled.
- HQs are often produced that are unrealistically high and toxicologically impossible (e.g., estimated HQs greater than 1,000, although HQs generated for the AP3 SLERA do not fall into this category).

- Trace soil concentrations of inorganic chemicals (including concentrations well below background levels) can lead to HQ threshold exceedances.

Sampling and Analytical Limitations. It is not possible to completely characterize the nature and extent of contamination on any site. Uncertainties arise from limits on the number of locations that can be sampled. The sampling protocol used at AP3, however, was designed to optimize efficiency of the sampling effort and reduce uncertainty by providing coverage of the affected area using historical data and site knowledge to focus on the ash layer, which is most likely to be representative of historical PBOW-related contamination. This approach biases potential soil contaminant concentrations higher than if sampling were performed for all soils equally within the entire ash pit and provides a more conservative estimate of potential risk. The sampling and analytical data are considered sufficient to conclude that the potential for adverse impacts associated with chemicals present at the site is very low.

Selection and Quantification of Chemicals of Potential Ecological Concern. Uncertainty associated with the processes used to identify COPECs and estimate EPCs arises from the following:

- Identifying background chemicals. Metals are judged to be present at concentrations comparable to background if the MDC does not exceed the BSC, or if statistical testing demonstrates that the site data and background data are drawn from the same population. Statistical testing of site data versus background was performed for this SLERA. Some organic chemicals, such as PAHs, may be considered to be anthropogenic background. The inclusion of ambient anthropogenic compounds in this SLERA may impart a conservative bias towards the risk assessment. Soil background values were compared with concentrations of metals detected in AP3 sediment in this SLERA. The use of soil background values for comparison to concentrations detected in sediment results in some added uncertainty to the SLERA. Naturally occurring levels of metals can differ in soil and sediment because the presence of metals in the sediment matrix can be affected by factors such as pH of the sediment and overlying water, oxidation/reduction conditions, sediment texture, presence/absence of organic matter, dissolved oxygen levels, etc. Although the concentrations of naturally occurring metals in soil and sediment may differ somewhat, soil background values can provide a reasonable point of reference for determining concentrations in sediment that may be associated with contamination and that warrant further consideration. Because concentrations in “true” background sediment may be higher or lower than their equivalent BSCs in soil, the direction of bias is unknown.

- Estimated EPCs are uncertain. For statistical purposes, if a constituent is positively identified at a site and has at least a single detection, all the samples with nondetects are assumed to have a value equal to half the reporting limit and are included in the

data set, although identified for the ProUCL software (EPA, 2010) as nondetects. However, typical laboratory methods are able to detect concentrations of a chemical well below the reporting limit, or even half the reporting limit. Therefore, although the exact concentration of a nondetect chemical is unknown, the use of half the reporting limit as a surrogate concentration likely overestimates the actual concentration and introduces a conservative bias into the risk assessment. Computed 95 percent UCL values are only estimates of the actual UCLs associated with each data set. Examples of factors affecting the uncertainty of these estimates include the number of samples, proportion of nondetects, conformance with an assumed mathematical distribution, imprecision of laboratory data, elevated detection limits (from dilutions, matrix interference, etc.), and statistical methodology. For some data sets, the MDC was used as the EPC. Uncertainties associated with the statistical determination of EPCs for the COPECs in each medium are as follows:

- A limited number of samples may not completely characterize the site because they provide less information about the population from which they are drawn than do larger sample sets. Accordingly, small sets tend to have a greater variability, which results in the calculation of wide confidence intervals on the mean concentration and high EPCs. In some cases, the 95 percent UCL may be greater than the MDC, which results in the selection of the MDC as the EPC. This did not occur at AP3, however. High confidence limits may introduce a conservative bias into the risk assessment.

- Biased soil sampling is a common practice at contaminated sites for the purposes of identifying nature and extent of contamination and to reduce the potential for Type I errors when performing environmental investigations (i.e., concluding that a site is clean when it really is not). The biased sampling approach likely overestimates chemical concentrations, resulting in greater chemical concentrations and predicted risk. The AP3 sampling strategy was not strongly biased, however, and this uncertainty is considered minor for this SLERA.

- Laboratory analytical techniques have a degree of uncertainty associated with them. These uncertainties are documented by using data qualifiers to reflect the degree of certainty of measurement. For example, some data were estimated (e.g., J-qualified), while other data were rejected (i.e., R-qualified). The direction of bias is unclear.

The use of the 95 percent UCL as the EPC is likely to underestimate the EPC in 5 percent of the cases and overestimate exposure in 95 percent of cases, imparting an overall conservative bias to the risk assessment. It should be noted that some COPEC MDCs measured in sediment and surface water were used as EPCs due to the limited number of samples; if COPECs considered to represent a plausible risk to aquatic populations were identified in these media, an additional sampling effort could potentially reduce the hazard estimate. However, this was not the case at AP3, and no additional sampling is recommended.

6.0 Risk Summary and Conclusions

Chemicals detected in soil, surface water, and sediment were screened against conservative benchmark values and other criteria to identify COPECs in media present at AP3. Three chemicals in soil, one chemical in surface water, and four chemicals in sediment were identified as COPECs for further evaluation. A food chain model was performed at each site to evaluate the potential hazard associated with exposure to these chemicals by representative measurement receptors. The home range size and density characteristics of various ecological species of concern make it unlikely that multiple individuals of a given species (i.e., local populations) would be exposed to the small areas of contaminated soil within the 1.5-acre AP3 site on a regular basis. In other words, the small size of the site precludes the possibility of population-level impacts at AP3, regardless of whether contamination is present. Nevertheless, hazard estimates were generated for a number of measurement receptors under the conservative assumption that impacts to populations is plausible.

Thallium in soil at AP3 was responsible for HQs exceeding 1 for two receptors, the deer mouse and the short-tailed shrew. However, thallium was only detected in 2 out of 16 samples at concentrations exceeding toxicological and background concentrations and only marginally exceeded these concentrations. Further, the HQs for the two mammalian receptors did not exceed 1 when the lowest-effect TRV (i.e., the LOAEL) was used. Therefore, adverse impacts to populations of mammalian receptors associated with thallium appear to be minimal. No other assessment receptor exceeded an HQ of 1 for any chemical detected at AP3. The bald eagle, a state-listed threatened species, was evaluated using the red-tailed hawk as a surrogate receptor. More conservative (i.e., no-effect level) toxicity values were used to calculate the HQs for this species to reflect the increased concern for a listed species. No HQs exceeded 1 for the hawk. It should be noted that the presence of an active bald eagle's nest may affect land use decisions at AP3, as any disturbance to their habitat at this site may constitute an illegal "taking" under the Endangered Species act.

The potential for adverse ecological impacts is considered to be very low at this site, and no chemicals are identified for further evaluation for protection of the environment at AP3
No further investigation or other actions appear to be necessary at this site for the purposes of identifying potential hazard to ecological receptors.

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TABLES

Table 2-1

Plant Species Observed at Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Vegetation observed during early summer (June 2, 2009) site walk	
Acer negundo	Box elder
Achillea millefolium	Yarrow
Agrimonia parviflora	Small-flowered groovebur
Alisma plantago-aquatica	Water plantain
Berberis thunbergii	Barberry
Bidens frondosa	Devil beggar ticks
Boehmeria cylindrica	Small-spike false nettle
Botrychium sp.	Grape fern
Bromus inermis	Smooth brome
Carex aggregata	Glomerate sedge
Carex amphibola var. turgida	Eastern narrowleaf sedge
Carex blanda	Eastern woodland sedge
Carex scoparia	Broom sedge
Carex sparganoides	Bur-reed sedge
Carex tribuloides	Blunt broom sedge
Carex vulpinoidea	Fox sedge
Carya cordiformis	Bitternut hickory
Celtis occidentalis	hackberry
Circaea lutetiana	Southern broad-leaved enchanters nightshade
Cornus racemosa	gray dogwood
Desmodium sp.	Tick trefoil
Dioscorea villosa	Yam root
Eleagnus umbellata	Autumn olive
Eleocharis palustris	Spike rush
Elymus sp.	Rye grass
Epilobium coloratum	Purple-leaved willow herb
Equisetum arvense	Field horsetail
Erechtites hieraciifolia	Fireweed
Erigeron philadelphicus	Fleabane
Eupatorium perfoliatum	Boneset
Eupatorium rugosum	White snakeroot
Euthamia graminifolia	Fragrant flat-topped goldenrod
Fragaria virginiana	Strawberry
Fraxinus pennsylvanica	Green ash
Galium asprellum	Rough bedstraw
Galium tinctorium	Bedstraw
Geum laciniatum	Rough avens
Gleditsia triacanthos	Honeylocust
Juncus effusus	Soft rush
Juniperus virginiana	Red cedar
Leersia oryzoides	Rice cutgrass
Leersia virginica	White grass
Lemna minor	Lesser duckweed

Table 2-1

Plant Species Observed at Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Lonicera tatarica	Tartarian honeysuckle
Lycopus americana	American bugleweed
Melilotus sp.	Sweet clover
Menta piperita	Peppermint
Mimulus ringens	monkeyflower
Onoclea sensibilis	Sensitive fern
Panicum dichotomiflorum	Fall panicgrass
Panicum dichotomum	Deer tongue grass
Parthenocissus quinquefolia	Virginia creeper
Phleum pratense	Timothy
Phragmites australis	Common reed
Pilea pumila	Clearweed
Poa compressa	Canada bluegrass
Poa pratensis	Kentucky bluegrass
Podophyllum peltatum	Mayapple
Polygonum hydropiper	Smartweed
Polygonum sp.	Smartweed
Polygonum virginiana	Virginia knotweed
Populus deltoides	Cottonwood
Prunus serotina	Black cherry
Ranunculus acris	Field buttercup
Rosa multiflora	Multiflora rose
Rosa setigera	Prairie rose
Rubus allegheniensis	Allegheny blackberry
Rubus occidentalis	Black raspberry
Rumex crispus	Curly dock
Rumex verticllatus	Swamp dock
Salix amygdaloides	Peachleaf willow
Salix nigra	Black willow
Satureja vulgaris	Wild basil
Scirpus atrovirens	Green bulrush
Scirpus cyperinus	Wool grass
Scirpus validus	Soft stem bulrush
Solanum carolinense	Horse nettle
Solidago canadensis	Canada goldenrod
Toxicodendron radicans	Poison ivy
Typha angustifolia	Narrow-leaf cattail
Ulmus americana	American elm
Verbesina alternifolia	Wingstem
Viola canadensis	Canada violet
Vitis riparia	Riverbank grape
Wolffia columbiana	Columbian water meal

Table 2-1

Plant Species Observed at Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Vegetation observed during fall (October 16, 2008) site walk	
Acer negundo	Box elder
Achillea millefolium	Yarrow
Agrimonia parviflora	Small-flowered groovebur
Alisma plantago-aquatica	Water plantain
Aster lateriflorus	Calico aster
Berberis thunbergii	Barberry
Bidens connata	Beggar ticks
Boehmeria cylindrica	Small-spike false nettle
Bromus inermis	Smooth brome
Carex sp.	sedges
Carex vulpinoidea	Fox sedge
Carya cordiformis	Bitternut hickory
Celtis occidentalis	hackberry
Cornus racemosa	gray dogwood
Cyperus esculentus	Chufa
Desmodium sp.	Tick trefoil
Eleagnus umbellata	Autumn olive
Eleocharis palustris	Spike rush
Elymus sp.	Rye grass
Epilobium coloratum	Purple-leaved willow herb
Equisetum arvense	Field horsetail
Erechtites hieraciifolia	Fireweed
Erigeron philadelphicus	Fleabane
Eupatorium perfoliatum	Boneset
Eupatorium rugosum	White snakeroot
Euthamia graminifolia	Fragrant flat-topped goldenrod
Fragaria virginiana	Strawberry
Fraxinus pennsylvanica	Green ash
Galium tinctorium	Bedstraw
Geum laciniatum	Rough avens
Gleditsia triacanthos	Honeylocust
Juncus effusus	Soft rush
Juniperus virginiana	Red cedar
Leersia oryzoides	Rice cutgrass
Leersia virginica	White grass
Lemna minor	Lesser duckweed
Lonicera tatarica	Tartarian honeysuckle
Lycopus americana	American bugleweed
Onoclea sensibilis	Sensitive fern
Panicum dichotomiflorum	Fall panicgrass
Panicum dichotomum	Deer tongue grass
Parthenocissus quinquefolia	Virginia creeper
Phleum pratense	Timothy

Table 2-1

Plant Species Observed at Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Scientific Name	Common Name
Phragmites australis	Common reed
Pilea pumila	Clearweed
Poa pratensis	Kentucky bluegrass
Polygonum hydropiper	smartweed
Polygonum sp.	Smartweed
Polygonum virginiana	Virginia knotweed
Populus deltoides	Cottonwood
Prunus serotina	Black cherry
Ranunculus acris	Field buttercup
Rosa multiflora	Multiflora rose
Rosa setigera	Prairie rose
Rubus allegheniensis	Allegheny blackberry
Rubus occidentalis	Black raspberry
Rumex crispus	Curly dock
Rumex verticllatus	Swamp dock
Salix amygdaloides	Peachleaf willow
Salix nigra	Black willow
Satureja vulgaris	Wild basil
Scirpus atrovirens	Green bulrush
Scirpus cyperinus	Wool grass
Scirpus validus	Soft stem bulrush
Scutellaria lateriflorus	Mad dog skullcap
Solanum carolinense	Horse nettle
Solidago canadensis	Canada goldenrod
Toxicodendron radicans	Poison ivy
Typha angustifolia	Narrow-leaf cattail
Ulmus americana	American elm
Verbesina alternifolia	Wingstem
Viola sp.	Violet
Vitis riparia	Riverbank grape
Wolffia columbiana	Columbian water meal

Table 2-2

Mammals Observed On Site and Likely to be Found in Erie County, Ohio Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site [a]
Didelphidae	*Didelphis virginiana*	Virginia opossum	
Talpidae	*Condylura cristata*	star-nosed mole (**T**)	
	Parascalops breweri	hairy-tailed mole	
	Scalopus aquaticus	Eastern mole	
Verspertilionidae	*Myotis keenii*	Keen's bat	
	M. lucifugus	little brown bat	
	M. sodalis	Indiana bat **(E*)**	
	Eptesicus fuscus	big brown bat	
	Lasionycteris noctivagans	silver-haired bat	
	Lasiurus borealis	red bat	
	L. cinereus	hoary bat	
	Nycticeius humeralis	evening bat	
	Pipistrellus subflavus	Eastern pipistrelle	
Leporidae	*Sylvilagus floridanus*	cottontail rabbit	
Sciuridae	*Glaucomys volans*	Southern flying squirrel	
	Marmota monax	woodchuck	
	Sciurus carolinensis	gray squirrel	
	S. niger	fox squirrel	
	Spermophilus tridecemlineatus	thirteen-lined ground squirrel	
	Tamias striatus	Eastern chipmunk	
	Tamiasciurus hudsonicus	red squirrel	
	Blarina brevicauda	short-tailed shrew	

Table 2-2

Mammals Observed On Site and Likely to be Found in Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site [a]
	Cryptotis parva	least shrew	
	Sorex cinereus	masked shrew	
Castoridae	*Castor canadensis*	beaver	
Cricetidae	*Microtus pennsylvanicus*	meadow vole	
	Mus musculus	house mouse	
	Ondatra zibethicus	muskrat	
	Peromyscus leucopus	white-footed mouse	
	P. maniculatus	deer mouse	
	Rattus norvegicus	Norway rat	
	Synaptomys cooperi	Southern bog lemming	
	Zapus hudsonius	meadow jumping mouse	
Procyonidae	*Procyon lotor*	raccoon	
Mustelidae	*Mephitis mephitis*	striped skunk	
	Mustela frenata	long-tailed weasel	
	M. nivalis	least weasel	
	M. vison	mink	
	Taxidea taxus	Badger (**T**)	
Canidae	*Canis latrans*	coyote	
	Urocyon cinereoargenteus	gray fox	
	Vulpes vulpes	red fox	
Cervidae	*Odocoileus virginianus*	white-tailed deer	X

Mammals likely to be found in Erie County based on information presented in Gottschang, J.L., 1981, *A Guide to the Mammals of Ohio* , Ohio State University Press, 176 pages.

T - Ohio threatened species.; E* - Federally endangered species.

[a] Shaw Site Reconnaissance April 29 and June 2 (both sites), 2009.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Ardeidae	*Ardea herodias*	great blue heron	(1) Regular visitor at ponds, streams, and ditches.
	Bublucus ibis	cattle egret (**E**)	(1) Rare visitor in short grass areas
	Butorides striatus	green heron	(1) Confirmed breeder, rare at ponds, streams.
	Casmerodius albus	great egret	(1) Regular visitor at ponds, streams, and ditches.
	Nycticorax nycticorax	black-crowned night heron (**T**)	(1) Regular visitor at ponds, streams, and ditches.
Anserinae	*Branta canadensis*	Canada goose	(1) (2*) Confirmed breeder; uncommon around ponds.
Anatinae	*Aix sponsa*	Wood duck	(1) Confirmed breeder, uncommon around ponds.
	Anas discors	blue-winged teal	Confirmed and/or probable breeder in county.
	A. platyrhynchos	mallard	(1) Confirmed breeder, uncommon at ponds, streams.
	A. rubripes	American black duck	(1) Possible breeder, rare at ponds, streams, ditches.
Merginae	*Lophodytes cucullatus*	hooded merganser	Confirmed and/or probable breeder in county.
Accipitrinae	*Accipiter striatus*	sharp-shinned hawk	Confirmed and/or probable breeder in county.
Buteoninae	*Buteo jamaicensis*	red-tailed hawk	Confirmed and/or probable breeder in county.
	B. lineatus	red-shouldered hawk	Confirmed and/or probable breeder in county.
	B. platypterus	broad-winged hawk	Confirmed and/or probable breeder in county.
	Haliaeetus leucocephalus	bald eagle (**T**)	(2*) Confirmed and/or probable breeder in county.
Anatidae	*Cygnus buccinator*	Trumpeter swan (**E**)	(1) Rare migrant seen flying toward lake.
Falconinae	*Falco sparverius*	American kestrel	Confirmed and/or probable breeder in county.
Phasianidae	*Colinus virginianus*	Northern bobwhite quail	Confirmed and/or probable breeder in county.
	Phasianus colchicus	ring-necked pheasant	Confirmed and/or probable breeder in county.
Rallidae	*Gallinula chloropus*	common moorhen	Confirmed and/or probable breeder in county.
	Porzana carolina	Sora	Confirmed and/or probable breeder in county.
Cathartidae	*Cathartes aura*	turkey vulture	Possible breeder in county.
Charadriidae	*Charadrius vociferus*	killdeer	Confirmed and/or probable breeder in county.
Scolopacidae	*Actitis macularia*	spotted sandpiper	Confirmed and/or probable breeder in county.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
	Bartramia longicauda	upland sandpiper (**T**)	(1) Confirmed breeder, rare in grassy areas.
	Gallinago gallinago	common snipe	Confirmed and/or probable breeder in county.
	Scolopax minor	American woodcock	(1) Confirmed breeder, uncommon in moist woodlots.
	Tringa solitaria	solitary sandpiper	Occasional visitor to mud flats.
Larinae	*Larus argentatus*	herring gull	(1) Regular visitor.
	L. delawarensis	ring-billed gull	(1) Regular visitor.
Columbidae	*Columba livia*	rock dove	(1) Confirmed breeder, very common.
	Zenaida macroura	mourning dove	(1) Confirmed breeder, very common.
Cuculidae	*Coccyzus americanus*	yellow-billed cuckoo	(1) Confirmed breeder, uncommon in woodlots, shrubs.
	C. erythropthalmus	black-billed cuckoo	(1) Probable breeder, rare in woodlots & shruby areas.
Tytonidae	*Bubo virginianus*	great horned owl	(1) Confirmed breeder, uncommon in woodlots.
	Otus asio	Eastern screech-owl	(1) Confirmed breeder, common in woodlots, shrubs.
	Strix varia	barred owl	Confirmed and/or probable breeder in county.
Caprimulgidae	*Chordeiles minor*	common nighthawk	(1) Possible breeder, rare.
Apodidae	*Chaetura pelagica*	chimney swift	(1) Confirmed breeder, uncommon.
Trochilidae	*Archilochus colubris*	ruby-throated hummingbird	(1) Confirmed breeder, uncommon in woodlots, shrubs.
Alcedinidae	*Ceryle alcyon*	belted kingfisher	(1) (2) Confirmed breeder, rare around ponds, streams.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Picidae	*Colaptes auratus*	Northern flicker	(1) (2*) Confirmed breeder, common in woodlots.
	Dryocopus pileatus	pileated woodpecker	Confirmed and/or probable breeder in county.
	Melanerpes carolinus	red-bellied woodpecker	(1) (2) Confirmed breeder, common in mature woods.
	M. erythrocephalus	red-headed woodpecker	(1) Confirmed breeder, uncommon in mature woods.
	Picoides pubescens	downy woodpecker	(1) Confirmed breeder, common in woodlots.
	P. villosus	hairy woodpecker	(1) Confirmed breeder, uncommon in large woodlots.
Tyrannidae	*Contopus virens*	Eastern wood-pewee	(1) Confirmed breeder, very common in large woodlots.
	Empidonax alnorum	alder flycatcher	(1) Possible breeder, rare in shrubby wet areas.
	E. minimus	least flycatcher (**T**)	(1) Probable breeder, rare in shrubby areas.
	E. traillii	willow flycatcher	(1) Confirmed breeder, very common in shrubby areas.
	E. virescens	Acadian flycatcher	(1) Confirmed breeder, uncommon in mature woodlots.
	Myiarchus crinitus	great crested flycatcher	(1) Confirmed breeder, common in large woodlots.
	Sayornis phoebe	Eastern phoebe	(1) Confirmed breeder, common near stream bridges.
	Tyrannus tyrannus	Eastern kingbird	(1) Confirmed breeder, very common - open shrub area.
Alaudidae	*Eremophila alpestris*	horned lark	(1) Probable breeder, rare in grassland, cultiv. fields.
Hirundinidae	*Hirundo pyrrhonota*	cliff swallow	Confirmed and/or probable breeder in county.
	H. rustica	barn swallow	(1) Confirmed breeder, very common near vacant bldgs.
	Progne subis	purple martin	(1) Probable breeder, rare.
	Riparia riparia	bank swallow	(1) Rare migrant or visitor.
	Stelgidopteryx seripennis	Northern rough-winged swallow	(1) Confirmed breeder, rare along streams, ditches.
	Tachycineta bicolor	tree swallow	(1) (2*) Confirmed breeder, rare around ponds.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Corvidae	*Corvus brachyrhynchos*	American crow	(1) (2) Confirmed breeder, very common in woodlots.
	Cyanocitta cristata	blue jay	(1) Confirmed breeder, abundant in woods.
Paridae	*Parus atricapillus*	black-capped chickadee	(1) Confirmed breeder, common in woodlots.
	P. bicolor	tufted titmouse	(1) Confirmed breeder, common in woodlots.
Sittidae	*Sitta carolinensis*	white-breasted nuthatch	(1) Confirmed breeder, uncommon in woodlots.
Troglodytidae	*Cistothorus palustris*	marsh wren	(1) Possible breeder, rare in wetlands with cattails.
	C. platensis	sedge wren	(1) Confirmed breeder, common in old grassy fields.
	Thryothorus ludovicianus	Carolina wren	(1) Probable breeder, rare in shrubby areas & woodlots.
	Troglodytes aedon	house wren	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	T. troglodytes	winter wren	(1) Rare migrant.
Mimidae	*Dumetella carolinensis*	gray catbird	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	Mimus polyglottos	northern mockingbird	(1) Confirmed breeder, rare in shrubby areas.
	Toxostoma rufum	brown thrasher	(1) Confirmed breeder, common in shrubby areas.
Turdidae	*Catharus fuscescens*	veery	(1) Confirmed breeder, uncommon in large woodlots.
	Hylocichla mustelina	wood thrush	(1) (2*) Confirmed breeder, very common in large woodlots.
	Sialia sialis	Eastern bluebird	(1) Confirmed breeder, common in openfields & edges.
	Turdus migratorius	American robin	(1) (2*) Confirmed breeder, abundant everywhere.
Sylviidae	*Polioptila caerulea*	blue-gray gnatcatcher	(1) Confirmed breeder, uncommon in woodlots.
	Regulus calendula	ruby-crowned kinglet	(1) Rare migrant.
Bombycillidae	*Bombycilla cedrorum*	cedar waxwing	(1) Confirmed breeder, very common everywhere.
Sturnidae	*Sturnus vulgaris*	European starling	(1) Confirmed breeder, abundant everywhere.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Vireonidae	*Vireo bellii*	Bell's vireo	Confirmed and/or probable breeder in county.
	V. flavifrons	yellow-throated vireo	(1) Confirmed breeder, uncommon in mature woodlots.
	V. gilvus	warbling vireo	(1) (2*) Confirmed breeder, common in large woodlots.
	V. griseus	white-eyed vireo	(1) Confirmed breeder, uncommon in shrubby areas.
	V. olivaceus	red-eyed vireo	(1) (2*) Confirmed breeder, very common in woodlots.
Parulidae	*Dendroica cerulea*	cerulean warbler	(1) Possible breeder, rare in mature woodlots.
	D. dominica	yellow-throated warbler	(1) Confirmed and/or probable breeder in county.
	D. pensylvanica	chestnut-sided warbler	(1) Probable breeder, uncommon in shrubby areas.
	D. petechia	yellow warbler	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	D. virens	*black-throated green warbler*	(1) Possible breeder, rare in mature woodlots.
	Geothylpis trichas	common yellowthroat	(1) (2*) Confirmed breeder, abundant in shrub areas, fields.
	Icteria virens	yellow-breasted chat	(1) Confirmed breeder, uncommon in shrubby areas.
	Mniotilta varia	black and white warbler	(1) Possible breeder, rare in mature woodlots.
	Oporornis formosus	Kentucky warbler	(1) Possible breeder, rare in mature woodlots.
	Protonotaria citrea	prothonotary warbler	Confirmed and/or probable breeder in county.
	Seiurus aurocapillus	overbird	(1) Probable breeder, rare in mature woodlots.
	S. motacilla	Louisiana waterthrush	Confirmed and/or probable breeder in county.
	Setophaga ruticilla	American redstart	(1) Probable breeder, rare in shrubby areas & woodlots.
	Vermivora leucobronchialis	Brewster's warbler	(1) Possible breeder, rare in shrubby areas and edges.
	V. pinus	blue-winged warbler	(1) Confirmed breeder, common in shrubby areas.
	Wilsonia citrina	hooded warbler	Confirmed and/or probable breeder in county.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
Icteridae	*Agelaius phoeniceus*	red-winged blackbird	(1) (2*) Confirmed breeder, abund. in grasslands, streams.
	Dolichonyx oryzivorus	bobolink	(1) Confirmed breeder, uncommon in grasslands.
	Icterus galbula	Northern oriole	(1) Confirmed breeder, uncommon in open woods.
	I. spurius	orchard oriole	(1) Confirmed breeder, common in open woods & edges.
	Molothrus ater	brown-headed cowbird	(1) Confirmed breeder, abundant everywhere.
	Quiscalus quiscula	common grackle	(1) Confirmed breeder, abundant everywhere.
	Sturnella magna	Eastern meadowlark	(1) (2) Confirmed breeder, common in grasslands.
Ploceidae	*Passer domesticus*	house sparrow	(1) Confirmed breeder, uncommon near buildings.
Thraupidae	*Piranga olivacea*	scarlet tanager	(1) Possible breeder, rare on open woods.
	P. ruba ruba	summer tanager	(1) Confirmed breeder, common in mature woodlots.
Fringillidae	*Ammodramus henslowii*	Henslow's sparrow	(1) Probable breeder, rare in old fields.
	A. savannarum	grasshopper sparrow	(1) Confirmed breeder, common in grasslands.
	Cardinalis cardinalis	Northern cardinal	(1) (2*) Confirmed breeder, abundant everywhere.
	Carduelis tristis	American goldfinch	(1) (2*) Confirmed breeder, abundant in shrubby areas.
	Carpodacus mexicanus	house finch	(1) Confirmed breeder, uncommon around buildings.
	Melospiza georgiana	swamp sparrow	(1) Confirmed breeder, rare in wet fields and ditches.
	M. melodia	song sparrow	(1) (2*) Confirmed breeder, abundant everywhere.
	Passerculus sandwichensis	Savannah sparrow	(1) Confirmed breeder, common in grasslands.
	Passerina cyanea	indigo bunting	(1) Confirmed breeder, abundant everywhere.
	Pheucticus ludovicianus	rose-breasted grosbeak	(1) Confirmed breeder, common in woodlots & edges.
	Pipilo erythrophthalmus	Eastern towhee	(1) Confirmed breeder, very common in woodlots, edges.
Fringillidae (continued)	*Pooecetes gramineus*	vesper sparrow	(1) Confirmed breeder, uncommon in grassland & fields.
	Spiza amercana	dickcissel	Confirmed and/or probable breeder in county.
	Spizella passerina	chipping sparrow	(1) Confirmed breeder, common in open woods & lawns.

Table 2-3

Birds Observed On Site and/or Likely to be Breeding
In Erie County, Ohio
Plum Brook Ordnance Works, Sandusky, Ohio

Family Name[a]	Scientific Name[b]	Common Name[c]	Status and Frequency
	S. pusilla	field sparrow	(1) Confirmed breeder, abundant in grasslands, shrubs.
	Zonotrichia albicollis	white-throated sparrow	(1) Late migrant, rare.

[a] Family names from Peterson, R.T., 1947, *A Field Guide to the Birds* , Sponsored by the National Audubon Society, Houghton Mifflin Company, Boston, Massachusetts.

[b] Peterjohn, B.G. and D.L. Rice, 1991, *The Ohio Breeding Bird Atlas* , The Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Columbus, Ohio, 416 pages.

[c] E - Ohio Endangered species; T - Ohio Threatened species.

Observation References:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1994).

(2) Observed during Shaw Site Reconnaissance at Ash Pit 3 on April 29, or June 2, 2009.

An asterisk (*) indicates the species was detected during the June site visit and is likely using the site for breeding.

Table 2-4

Reptiles Observed On Site and Likely to be Found at Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site
Chelydridae	*Chelydra serpentina*	snapping turtle	(1)
Kinosternidae	*Sternotherus odoratus*	musk turtle	
Emydidae	*Chrysemys picta*	painted turtle	(1)
	Emys blandingii	Blanding's turtle	(1)
	Terrapene carolina	box turtle	(1)
Colubridae	*Elaphe vulpina*	fox snake	(1)
	Heterodon platyrhinos	hog-nosed snake	
	Nerodia septemvittata	queen snake	
	N. sipedon sipedon	water snake	(1)
	Opheodrys vernalis	green snake	(1)
	Storeria dekayi	Dekay's brown snake	(1)
	Thamnophis butleri	Butler's garter snake	(1)
	T. sauritus	ribbon snake	
	T. sirtalis	common garter snake	(1)

References:

Conant, R. and J.T. Collins, 1991, *Reptiles and Amphibians, Eastern/Central North America* , Peterson Field Guide, Third Edition, Houghton Mifflin Company, Boston.

Pfingsten, R.A. and F.L. Downs (eds.), 1989, *Salamanders of Ohio* , Ohio Biological Survey Bulletin, New Series, Vol. 7, No. 2, 315 pages, 29 pls.

Wright, A.H. and A.A. Wright, 1957, *Handbook of Snakes of the United States and Canada* , Volumes I and II, Comstock Publishing Associates, Ithaca and London, 1105 pages.

Reference for on-site observation:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1995).

Table 2-5

Amphibians Observed On Site and Likely to be Found at Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site
Ambystomatidae	*Ambystoma texanum*	smallmouth salamander	(1)
	Plethodon cinereus	redback salamander	(1)
Bufonidae	*Bufo americanus*	American toad	(1)
Hylidae	*Acris gryllus*	cricket frog	(1)
	Hyla versicolor	gray treefrog	(1)
	Pseudacris crucifer	spring peeper	(1)
	P. triseriata	chorus frog	(1)
Ranidae	*Rana catesbeiana*	bullfrog	(1)
	R. clamitans	green frog	(1)
	R. pipiens	Northern leopard frog	(1)

References:

Conant, R. and J. T. Collins, 1991, *Reptiles and Amphibians, Eastern/Central North America*, Peterson Field Guide, Third Edition, Houghton Mifflin Company, Boston.

Pfingsten, R. A. and F. L. Downs (eds.), 1989, *Salamanders of Ohio*, Ohio Biological Survey Bulletin, New Series, Vol. 7, No. 2, 315 pages, 29 pls.

Reference for on-site observation:

(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1995).

Table 2-6

Fish Species Observed at Plum Brook Ordnance Works, Sandusky, Ohio

Family Name	Scientific Name	Common Name	Observed On Site	Habitat[a]
Catostomidae	*Catostomus commersoni*	white sucker	(1)	lotic
Centrarchidae	*Lepomis cyanellus*	green sunfish	(1)	lentic, lotic
	Lepomis species	green sunfish hybrid	(1)	lentic
	L. gibbosus	pumpkinseed sunfish	(1)	lentic
	L. macrochirus	bluegill	(1)	lentic
	Micropterus salmoides	largemouth bass	(1)	lentic
Cyprinidae	*Campostoma anomalum*	central stoneroller	(1)	lotic
	Carassius auratus	goldfish	(1)	lentic
	Luxilus chrysocephalus	striped shiner	(1)	lotic
	Pimephales notatus	bluntnose minnow	(1)	lotic
	P. promelas	fathead minnow	(1)	lotic
	Semotilus atromaculatus	creek chub	(1)	lotic
Gasterosteidae	*Culaea inconstans*	brook stickleback	(1)	lotic
Ichtaluridae	*Ameiurus melas*	black bullhead	(1)	lentic

[a] Lotic - Flowing water such as brooks, ditches, and creeks.
Lentic - Still waters such as ponds and lakes.

Reference for on-site observation:
(1) *Biological Inventory of Plum Brook Station* (Ohio Department of Natural Resources, 1994).

Table 2-7

Summary of Samples Evaluated in the Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Location	Sample Number	Sample Purpose	Sample Date	Depth (ft)	Analyses
Soil Samples [a]					
ASH PIT 3-SB01	AP0032	REG	19-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB01	AP0033	REG	19-Aug-09	3 - 5	Exp, Metals, PCB, SVOC
ASH PIT 3-SB02	AP0036	REG	19-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB02	AP0037	REG	19-Aug-09	1.2 - 2.3	Exp, Metals, PCB, SVOC
ASH PIT 3-SB03	AP0039	REG	19-Aug-09	0.2 - 1.7	Exp, Metals, PCB, SVOC
ASH PIT 3-SB04	AP0042	REG	21-Aug-09	0.3 - 0.8	Exp, Metals, PCB, SVOC
ASH PIT 3-SB04	AP0043	REG	21-Aug-09	0.8 - 1.5	Exp, Metals, PCB, SVOC
ASH PIT 3-SB05	AP0045	REG	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB05	AP0046	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0048	REG	20-Aug-09	0.2 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0049	REG	20-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB06	AP0061A	REG	20-Aug-09	2 - 2.7	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0051	REG	21-Aug-09	0 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0052	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB07	AP0059	FD	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0054	REG	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0056	FD	21-Aug-09	0.3 - 1	Exp, Metals, PCB, SVOC
ASH PIT 3-SB08	AP0055	REG	21-Aug-09	1 - 2	Exp, Metals, PCB, SVOC
Sediment Samples					
AP3-SD01	AP1009	REG	23-May-09	0 - 0.5	Exp, Metals, PCB, SVOC
AP3-SD02	AP1010	REG	23-May-09	0 - 0.5	Exp, PCB
AP3-SD03	AP1011	REG	23-May-09	0 - 0.5	Exp, PCB
PBOW99-SDA302	PBOW99SDA302	REG	11-Jun-99	0 - 0	Metals, SVOC
PBOW99-SDA303	PBOW99SDA303	REG	11-Jun-99	0 - 0	Metals, SVOC
PBOW99-SDA303	PBOW99SDA303DUP	FD	11-Jun-99	0 - 0	Metals, SVOC
Surface Water Samples					
AP3-SW01	AP2009	REG	23-May-09	NA	Exp
AP3-SW02	AP2010	REG	23-May-09	NA	Exp
AP3-SW03	AP2011A	REG	27-May-09	NA	Exp
PBOW99-SWA301	PBOW99SWA301	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA302	PBOW99SWA302	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA303	PBOW99SWA303	REG	11-Jun-99	NA	Metals, SVOC
PBOW99-SWA303	PBOW99SWA303DUP	FD	11-Jun-99	NA	Metals, SVOC

[a] Although these samples were collected as sediment samples, they may be more accurately described as sediment samples. See text for details.

FD - Field duplicate.
Exp - Explosives.
NA - Not applicable.
Pest - Organochlorine pesticide.
PCB - Polychlorinated biphenyl.
SVOC - Semivolatile organic compound.

Table 2-8

Statistical Summary and COPEC Selection for Chemicals Detected in Soil (0 to 6 Feet Below Ground Surface)
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]	Distribution [e]	95% UCL [e] (mg/kg)	EPC [f] (mg/kg)	UCL 0-1' soil depth [g] (mg/kg)	MDC 0-1' soil depth [g] (mg/kg)	EPC 0-1' soil depth [g] (mg/kg)
Inorganics																		
Aluminum	16 / 16	100	4.76E+03		1.14E+04		1.20E+01	2.90E+01	7.99E+03	1.55E+04	pH Dependent	N (b)			---			---
Antimony	7 / 16	44	5.00E-01	J	2.34E+00	/UJ	3.50E+00	1.20E+01	2.46E+00	9.30E+00	0.27	N (b)			---			---
Arsenic	16 / 16	100	4.90E+00		4.41E+01		4.70E-01	1.60E+00	1.67E+01	3.65E+01	18	N (d)			---			---
Barium	16 / 16	100	3.85E+01		2.03E+02		1.20E+01	2.90E+01	8.28E+01	8.26E+02	330	N (a)			---			---
Beryllium	16 / 16	100	4.00E-01		2.10E+00		2.90E-01	7.40E-01	9.47E-01	1.00E+00	21	N (a)			---			---
Cadmium	9 / 16	56	1.40E-01	J	4.40E-01		2.30E-01	4.00E+00	4.74E-01	NA	0.36	Y	Normal	2.63E-01	2.63E-01	3.77E-01	4.40E-01	3.77E-01
Calcium	16 / 16	100	2.06E+03		5.28E+04		3.00E+02	7.40E+02	2.34E+04	5.23E+04	Nutrient	N (c)			---			---
Chromium	16 / 16	100	6.90E+00		1.66E+01		1.20E+00	3.00E+00	1.19E+01	2.90E+01	26	N (a)			---			---
Cobalt	16 / 16	100	4.50E+00		1.22E+01		2.90E+00	7.40E+00	6.87E+00	1.16E+02	13	N (a)			---			---
Copper	16 / 16	100	1.16E+01		1.24E+02		1.50E+00	3.70E+00	2.81E+01	5.62E+01	28	N (d)			---			---
Iron	16 / 16	100	1.12E+04		6.83E+04		5.80E+00	2.00E+01	2.60E+04	2.34E+05	pH Dependent	N (b)			---			---
Lead	16 / 16	100	3.40E+00	J	2.04E+01		5.90E+00	2.00E+01	9.72E+00	4.86E+01	11	N (b)			---			---
Magnesium	16 / 16	100	3.43E+02	J	1.75E+04		2.90E+02	7.40E+02	7.05E+03	1.04E+04	Nutrient	N (c)			---			---
Manganese	16 / 16	100	5.45E+01		1.27E+03		1.10E+00	8.90E+00	3.34E+02	3.51E+03	220	N (b)			---			---
Mercury	13 / 16	81	1.40E-02	J	1.50E-01		9.00E-02	2.40E-01	5.96E-02	8.50E-02	0.00051	N (d)			---			---
Nickel	16 / 16	100	1.15E+01		3.19E+01		2.30E+00	5.90E+00	1.72E+01	5.51E+01	38	N (a)			---			---
Potassium	16 / 16	100	5.24E+02	J	2.11E+03		5.80E+02	1.50E+03	1.29E+03	3.39E+03	Nutrient	N (c)			---			---
Selenium	16 / 16	100	5.90E-01	J	2.90E+00	J	5.90E+00	2.00E+01	1.52E+00	2.00E+00	0.52	N (d)			---			---
Sodium	16 / 16	100	1.68E+02	J	6.40E+02	J	5.80E+02	1.50E+03	3.89E+02	NA	Nutrient	N (c)			---			---
Thallium	3 / 16	19	5.00E-01	J	3.00E+00		5.80E-01	6.50E+00	1.50E+00	1.30E+00	1	Y	Normal	1.47E+00	1.47E+00	2.69E+00	3.00E+00	2.69E+00
Vanadium	16 / 16	100	1.07E+01		2.89E+01		2.90E+00	9.90E+00	1.95E+01	4.09E+01	7.8	N (b)			---			---
Zinc	16 / 16	100	1.59E+01	J	7.87E+01		1.20E+00	2.90E+00	4.55E+01	3.22E+02	46	N (b)			---			---
Polychlorinated biphenyls (PCB)																		
Aroclor 1260	2 / 16	13	1.50E-02	J	4.30E-02	J	2.10E-02	5.00E-02	1.69E-02		0.371	N (a)			---			---
Explosives																		
Dinitrotoluene, 2,6-	4 / 16	25	5.12E-02	J	6.62E-02	JJ	1.40E-01	1.90E-01	7.59E-02		0.0328	Y	Normal	6.30E-02	6.30E-02	6.58E-02	6.62E-02	6.58E-02
Semivolatile Organic Compounds																		
Acenaphthylene	1 / 16	6	5.16E-02	J	5.16E-02	J	2.00E-01	4.95E-01	1.49E-01		29	N (a)			---			---
Benzo(a)anthracene	1 / 16	6	1.56E-01	J	1.56E-01	J	2.00E-01	4.95E-01	1.56E-01		1.1	N (a)			---			---
Benzo(a)pyrene	1 / 16	6	1.68E-01	J	1.68E-01	J	2.00E-01	4.95E-01	1.56E-01		1.1	N (a)			---			---
Benzo(b)fluoranthene	1 / 16	6	2.68E-01		2.68E-01		2.00E-01	4.95E-01	1.63E-01		1.1	N (a)			---			---
Benzo(ghi)perylene	1 / 16	6	8.82E-02	J	8.82E-02	J	2.00E-01	4.95E-01	1.51E-01		1.1	N (a)			---			---
Benzo(k)fluoranthene	1 / 16	6	9.72E-02	J	9.72E-02	J	2.00E-01	4.95E-01	1.52E-01		1.1	N (a)			---			---
Chrysene	1 / 16	6	1.90E-01	J	1.90E-01	J	2.00E-01	4.95E-01	1.58E-01		1.1	N (a)			---			---
Fluoranthene	1 / 16	6	4.01E-01		4.01E-01		2.00E-01	4.95E-01	1.71E-01		1.1	N (a)			---			---
Indeno(1,2,3-cd)pyrene	1 / 16	6	9.14E-02	J	9.14E-02	J	2.00E-01	4.95E-01	1.52E-01		1.1	N (a)			---			---
Phenanthrene	1 / 16	6	1.07E-01	J	1.07E-01	J	2.00E-01	4.95E-01	1.53E-01		29	N (a)			---			---
Pyrene	1 / 16	6	2.73E-01		2.73E-01		2.00E-01	4.95E-01	1.63E-01		1.1	N (a)			---			---

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NSV - No screening value.
U - Nondetect; sample results from field duplicates may combine a nondetect with a detect.
UCL - Upper confidence limit.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, ***Site Investigation of Acid Areas*** , Plum Brook Ordnance Works, Sandusky, Ohio, August.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
(d) - Statistical test shows background and site data to be the same; see Appendix C.
[d] Y - Chemical is chosen as COPEC.
[e] 95% UCL (Upper confidence limit) determined using ProUCL Version 4.00.05 (U.S. Environmental Protection Agency (EPA), 2010, Office of Research and Development, Las Vegas, Nevada, and Technology Support Center, Atlanta, GA, May, on line at http://www.epa.gov/esd/tsc/TSC_form.htm. Calculated only for COPC.
[f] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.
[g] The EPC for the COPEC at the 0-1 feet soil depth range is used as the exposure concentration for some ecological receptors. Two samples (AP0039 and AP0043) with an end depth slightly greater than 1 foot were also used. See text for details.

Table 2-9

Statistical Summary and COPEC Selection for Chemicals Detected in Surface Water
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent hits	Range of values, µg/L: Detected Concentration Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Arithmetic Mean µg/L	ESV [a] µg/L	COPEC? [b,c]	EPC [d] µg/L
Metals												
Calcium	3 / 3	100	24450		27900		5000	5000	2.67E+04	Nutrient	N (b)	---
Magnesium	3 / 3	100	8990		9470		5000	5000	9.29E+03	Nutrient	N (b)	---
Manganese	3 / 3	100	41.65	J	195		15	15	1.30E+02	1.20E+02	Y	1.95E+02
Sodium	2 / 3	67	9740		10350		5000	5000	7.53E+03	Nutrient	N (b)	---

ESV - Ecological screening value.
EPC - Exposure point concentration.
COPEC - Chemical of potential ecological concern.
µg/L - Micrograms per liter.
VQ - Validation qualifier.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.

[a] ESVs and their sources are in Appendix B.
[b] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Essential nutrient.
[c] Y - Chemical is chosen as COPEC.
[d] Concentration used in risk assessment equal to maximum detected concentration.

Table 2-10

Statistical Summary and COPEC Selection for Chemicals Detected in Sediment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Reporting Limits Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	ESV [b] mg/kg	COPEC? [c,d]	EPC [e] mg/kg
Inorganics													
Aluminum	3 / 3	100	2.48E+03	J	7.75E+03		1.80E+01	3.31E+01	4.61E+03	1.55E+04	NSV	N (b)	---
Antimony	1 / 3	33	5.40E-01	J	5.40E-01	J	1.50E+00	5.40E+00	7.13E-01	9.30E+00	NSV	N (b)	---
Arsenic	3 / 3	100	3.70E+00		6.40E+00		7.20E-01	1.70E+00	5.33E+00	3.65E+01	9.79E+00	N (a)	---
Barium	2 / 3	67	2.66E+01		4.78E+01		1.80E+01	3.31E+01	2.99E+01	8.26E+02	NSV	N (b)	---
Beryllium	1 / 3	33	2.60E-01	J	2.60E-01	J	4.50E-01	8.30E-01	3.51E-01	1.00E+00	NSV	N (b)	---
Cadmium	1 / 3	33	3.00E-01	J	3.00E-01	J	3.05E-01	3.60E-01	2.06E-01	NA	9.90E-01	N (a)	---
Calcium	3 / 3	100	5.09E+03		1.81E+04		4.50E+02	8.28E+02	1.09E+04	5.23E+04	Nutrient	N (c)	---
Chromium	3 / 3	100	5.40E+00		1.08E+01		7.55E-01	9.00E-01	7.53E+00	2.90E+01	4.34E+01	N (a)	---
Cobalt	1 / 3	33	4.10E+00	J	4.10E+00	J	4.50E+00	8.30E+00	4.01E+00	1.16E+02	5.00E+01	N (a)	---
Copper	3 / 3	100	1.44E+01		1.26E+02		2.30E+00	4.10E+00	7.15E+01	5.62E+01	3.16E+01	Y	1.26E+02
Iron	3 / 3	100	6.71E+03		1.30E+04	J	9.00E+00	1.66E+01	1.08E+04	2.34E+05	Nutrient	N (c)	---
Lead	3 / 3	100	6.70E+00		1.19E+01		4.55E-01	9.00E+00	9.10E+00	4.86E+01	3.58E+01	N (a)	---
Magnesium	3 / 3	100	2.57E+03		5.67E+03		4.50E+02	8.28E+02	4.20E+03	1.04E+04	Nutrient	N (c)	---
Manganese	3 / 3	100	1.30E+02	J	3.18E+02		1.40E+00	2.50E+00	1.96E+02	3.51E+03	4.60E+02	N (a)	---
Mercury	1 / 3	33	2.70E-02	J	2.70E-02	J	1.40E-01	1.70E-01	6.23E-02	8.50E-02	1.80E-01	N (a)	---
Nickel	3 / 3	100	6.55E+00		1.25E+01		3.60E+00	6.60E+00	9.85E+00	5.51E+01	2.27E+01	N (a)	---
Potassium	2 / 3	67	3.37E+02	J	1.27E+03		7.59E+02	1.80E+03	6.62E+02	3.39E+03	Nutrient	N (c)	---
Selenium	1 / 2	50	1.10E+00		1.10E+00		7.55E-01	8.30E-01	7.39E-01	2.00E+00	NSV	N (b)	---
Vanadium	3 / 3	100	6.55E+00	/U	1.93E+01		4.50E+00	8.30E+00	1.24E+01	4.09E+01	NSV	N (b)	---
Zinc	3 / 3	100	2.63E+01		5.28E+01	J	1.80E+00	3.30E+00	4.25E+01	3.22E+02	1.21E+02	N (a)	---
Semivolatiles Organic Compounds													
Benzo(a)anthracene	1 / 3	33	1.43E-01	J	1.43E-01	J	3.10E-01	5.50E-01	2.23E-01		1.08E-01	Y	1.43E-01
Benzo(a)pyrene	1 / 3	33	1.58E-01	J	1.58E-01	J	3.10E-01	5.50E-01	2.28E-01		1.50E-01	Y	1.58E-01
Benzo(b)fluoranthene	1 / 3	33	2.40E-01	J	2.40E-01	J	3.10E-01	5.50E-01	2.55E-01		1.04E+01	N (a)	---
Benzo(ghi)perylene	1 / 3	33	1.01E-01	J	1.01E-01	J	3.10E-01	5.50E-01	2.09E-01		1.70E-01	N (a)	---
Benzo(k)fluoranthene	1 / 3	33	8.05E-02	J	8.05E-02	J	3.10E-01	5.50E-01	2.02E-01		2.40E-01	N (a)	---
Chrysene	1 / 3	33	1.59E-01	J	1.59E-01	J	3.10E-01	5.50E-01	2.28E-01		1.66E-01	N (a)	---
Fluoranthene	1 / 3	33	2.53E-01	J	2.53E-01	J	3.10E-01	5.50E-01	2.59E-01		4.23E-01	N (a)	---
Indeno(1,2,3-cd)pyrene	1 / 3	33	1.11E-01	J	1.11E-01	J	3.10E-01	5.50E-01	2.12E-01		2.00E-01	N (a)	---
Pyrene	1 / 3	33	2.06E-01	J	2.06E-01	J	3.10E-01	5.50E-01	2.44E-01		1.95E-01	Y	2.06E-01

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
EPC - Exposure point concentration.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
NA - Not available.
NSV - No screening value available.
VQ - Validation qualifier.
[a] Soil background screening concentrations are used for sediment. See text for details.
[b] ESVs and their sources are in Appendix B.
[c] N - Chemical is not chosen as a COPEC:
(a) - Maximum detected concentration is less than the ESV.
(b) - Maximum detected concentration is less than the BSC.
(c) - Essential nutrient.
[d] Y - Chemical is chosen as COPEC.
[e] Concentration used in risk assessment equal to maximum detected concentration.

Table 3-1

Data Used to Model Exposure in the Indicator Wildlife Species
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Indicator Species	Class/ Order	Average Body Weight[a] (kg)	Average Home Range[a] (ha)	Dietary Intake[a] (kg[dw]/day)	Soil/Sed. Intake (kg[dw]/day)	Water Intake (L/day)[b]	Trophic Level	Dietary Composition[a] (percent)
Deer mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	0.0148	0.062	0.0028[d]	0.000056 (2%)	0.0022	Omnivore	Terr. Inverts. : 39 Plants: 61
Eastern cottontail (*Sylvilagus floridanus*)	Mammalia/ Lagomorpha	1.132	3.1	0.096[d]	0.006 (6.3%)	0.11	Herbivore	Plants: 100
Short-tailed shrew (*Blarina brevicauda*)	Mammalia/ Insectivora	0.015	0.39	0.0022[d]	0.00023 (10.4%)	0.0023	Insectivore	Terr. Inverts.: 100
White-tailed deer (*Odocoileus virginianus*)	Mammalia/ Artiodactyla	61[c]	518[c]	2.0[d]	0.04 (2%)	4	Herbivore	Plants: 100
Marsh wren (*Cistothorus palustris*)	Aves/ Passeriformes	0.01	0.054	0.0029[d]	0.000058 (2%)	0.0027	Insectivore	Terr. Inverts.: 100
Red-tailed hawk (*Buteo jamaicensis*)	Aves/ Falconiformes	0.957	842	0.057[d]	0.00114 (2%)	0.057	Carnivore	Rabbits: 25.3 Shrews: 25.3 Mice: 25.3 Birds: 24
Muskrat[e] (*Ondata zibethicus*)	Mammalia/ Rodentia	1.174	0.13	0.352	negligible	0.11	Herbivore	Aquatic plants: 100
Raccoon (*Procyon lotor*)	Mammalia/ Carnivora	5.1	156	0.26[d]	0.024 (9.4%) (assumed 50% soil and 50% sediment)	0.43	Omnivore	Aq. Inverts.: 21 Terr. Inverts.: 30 Mice: 5 Plants: 42 (50% terrestrial, 50% aquatic) Fish: 2

[a] From EPA (1993), except as noted.

[b] Allometric equations for mammals and birds from EPA (1993), as follows:

Mammals: WI (water ingestion; L/day) = 0.099 $Wt^{0.90}$ (kg), where Wt = body weight.

Birds: WI (L/day) = 0.059 $Wt^{0.67}$ (kg).

[c] Information is from *A Guide to the Mammals of Ohio* (Gottschang, 1981).

[d] Allometric equation for mammals: FI (kg/day) = 0.0687 $Wt^{0.822}$ for shrew, deer, and raccoon; FI (g/day) = 0.621 $Wt^{0.564}$ for rodents (deer mouse); and FI (g/day) = 0.577 $Wt^{0.727}$ for small herbivores (cottontail).
Allometric equation for birds: FI (kg/day) = 0.0582 Wt0.651 (EPA, 1993), where FI = food ingestion (dry weight) and Wt = body weight. Allometric equations from EPA (1993).

[e] Exposure parameters obtained from OEPA-DERR (2008) Ecological Risk Assessment Guidance Document, Revised April 2008, On line: http://www.epa.ohio.gov/portals/30/rules/RR-031.pdf.

References

U.S. Environmental Protection Agency (EPA), 1993, Wildlife Exposure Factors Handbook, Vols. I and II, Office of Research and Development, Washington, DC, EPA/600/R-93/187a.

Table 3-2

Bioaccumulation Factors or Regression
Equations Utilized for the Soil-to-Plant and Sediment-to-Aquatic Plant Pathways
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

COPEC in Soil or Sediment	EPA, 2008	Efroymson et al., 2001				Other BAF/BCF (1)		Regression Equation (2)	Recommended BAF/BCF (3)	Source
		Minimum BAF/BCF	Median BAF/BCF	90th Percentile BAF/BCF[b]	Maximum BAF/BCF					
Inorganics										
Cadmium	ln (AGP)=0.546(ln[soil])-0.475	0.0087	0.59	3.3	23	0.35	a	ln (AGP)=0.55(ln[soil])-0.48	Eco-SSL Regression	EPA (2008), Table 4a
Copper	ln (AGP)=0.394(ln[soil])+0.668	0.0011	0.12	0.63	7.4	0.8	c	ln (AGP)=0.39(ln[soil])+0.67	Eco-SSL Regression	EPA (2008), Table 4a
Thallium	--	--	--	--	--	0.0022	d	--	0.0022	Baes (1984)
Nitroaromatics										
2,6-Dinitrotoluene	--	--	--	--	--	--		Log (BCF)=-0.578(Log[Kow])+1.588	0.374	Travis & Arms Kow Regression Eq.
SVOCs										
Benzo(a)anthracene	ln (AGP)=0.5944(ln[soil])-2.7078	--	--	--	--	--		--	Eco-SSL Regression	EPA (2008), Table 4b
Benzo(a)pyrene	ln(AGP) = 0.975(ln[soil])-2.0615	--	--	--	--	--		--	Eco-SSL Regression	EPA (2008), Table 4b
Pyrene	0.72	--	--	--	--	0.72	b	--	0.72	EPA (2008), Table 4b

Notes:

1. For inorganic chemicals without BAF/BCF data, BAF/BCFs were derived from the Baes et al. (1984) and IAEA (1994) data.
2. Efroymson, R.A., et. al., 2001, *Uptake of Inorganic Chemicals from Soil by Plant Leaves: Regressions of Field Data*, Environ. Tox. Chem., 20:2561-2571 for AGP (above ground plant tissue concentration) and Travis and Arms (1988) for BCF.
3. For the values estimated using Travis and Arms (1988) Kow regression equation, Kow values were obtained using the Kow WIN application in EPA's EPI Suite software (http://www.epa.gov/oppt/exposure/pubs/episuite.htm).

-- indicates that a BAF/BCF or regression equation is not available.

[a] Average of the vegetative and reproductive transfer factors presented in Baes et al. (1984); note: value from this reference used if no appropriate value available from IAEA (1994).

[b] From USEPA (2008).

[c] IAEA (1994); note: value from this reference used, compared with Baes et al. (1984), as IAEA (1994) is more current.
International Atomic Energy Agency (IAEA), 1994, Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments, Technical Report Series No. 364, Vienna.

[d] Average of the vegetative and reproductive transfer factors presented in Baes et al. (1984); note: value from this reference used if no appropriate value available from IAEA (1994).

References:

Baes, C. F., R.D. Sharp, A.L. Sjoreen and R. W. Shor (1984). *A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture*. ORNL-5786, September 1984.
Efroymson, R.A., et. al., 2001, *Uptake of Inorganic Chemicals from Soil by Plant Leaves: Regressions of Field Data*, Environ. Tox. Chem., 20:2561-2571
EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)*, Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
International Atomic Energy Agency (IAEA) (1994). Handbook of parameter values for the prediction of radiocuclide transfer in temperate environments. Technical Reports Serices No. 364. June 24, 1994.

Table 3-3

Bioaccumulation Factors or Regression Equations Utilized for the Soil-to-Earthworm Pathway
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Constituent	PBOW Site-Specific BCF [a]	Sample, et al. 1998			Beyer, 1990 BAF/BCF	Regression Equation	Recommended BAF/BCF	Source of BAF/BCF	Rationale for BAF/BCF
		Median BAF/BCF	90th Percentile BAF/BCF	Maximum BAF/BCF					
Inorganics									
Cadmium	--	7.708	40.69	190	--	ln (EW)=0.795(ln[soil])+2.114	Regression Equation	EPA 2008, Table 4a	Chemical-specific regression equation
Thallium	--	--	--	--	--	--	0.3	See footnote b	Median value for inorganics from Sample et al., 1998.
Semivolatile Organics									
2,6-Dinitrotoluene	--	--	--	--	--	--	0.1	Site field study	Use 2,4-Dinitrotoluene as surrogate; Plum Brook site-specific BAF (IT, 2001)

-- indicates that a BAF/BCF or regression equation is not available.
BAF - Bioaccumulation factor.
BCF - Bioconcentration factor.
[a] IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.
[b] For inorganic chemials lacking BAFs, the geometric mean of available inorganic chemical Median BAF/BCFs from Sample et al. (1998) were calculated based on the data provided below, and used as surrogate values:

	Median BAF/BCF
Aluminum	0.043
Arsenic	0.224
Barium	0.091
Beryllium	0.045
Cadmium	7.708
Chromium	0.306
Cobalt	0.122
Copper	0.515
Iron	0.036
Lead	0.266
Manganese	0.054
Mercury	1.693
Molybdenum	0.953
Nickel	1.059
Selenium	0.985
Silver	2.045
Strontium	0.087
Vanadium	0.042
Zinc	3.201
Geometric Mean	**0.30**

Kow values obtained from EPA EPI Suite Version 4.0, http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

References:

Beyer, W.N., 1990, *Evaluating Soil Contamination, Biological Report 90(2)* , U.S. Department of the Interior, U.S. Fish and Wildlife Service.
EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)* , Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.
Sample, B. E, et. al., 1998, *Development and Validation of Bioaccumulation Models for Earthworms* , ES/ER/TM-220.

Table 3-4

Bioaccumulation Factors or Regression Equations Utilized for the
Soil-to-Mammal/Bird[a] Pathway
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, OH

Constituent	Sample et al., (1998)						EPA (1999)	Other BAF		Regression Equation	Recommended BAF	Rationale for Recommended BAF
	Insectivore Median BAF	Herbivore Median BAF	Omnivore Median BAF	General[b] Median BAF	General[b] Maximum BAF	General[b] 90th percentile BAF	Maximum BAF Avian or Mammal					
Inorganics												
Cadmium	2.105	0.1258	0.1217	0.3333	69.561	3.9905	0.0044	--	--	ln (M)=0.4723(ln[soil]) -1.2571	Regression	EPA (2008)-Attach 4-1, Table 4a
Thallium	--	--	0.1124	0.1124	0.123	0.1227	--	--	--	--	0.1227	"General: 90th Percentile" used because of uncertainties regarding the type of mammalian prey items.
Semivolatile Organics												
2,6-Dinitrotoluene	--	--	--	--	--	--	6.34E-08	--	--	--	6.34E-08	EPA (1999), max for any taxa in Table D-3

-- indicates that a BAF is not available.
BAF - Bioaccumulation factor.
PAH - Polycyclic aromatic hydrocarbon.
[a] Bird BAF values were based on the recommended small mammal BAF values, as bird uptake values are not readily available.
[b] "General" indicates that the combination dataset used for insectivore, herbivore, and omnivore receptors was used to estimate a "general" receptor BAF value.

References:
EPA, 2008, *Guidance for Developing Ecological Soil Screening Levels (Eco-SSL)* , Office of Solid Waste and Emergency Response, Directive 92857.7-55, Washington, D.C.
EPA, 1999, *Screening level ecological risk assessment protocol for hazardous waste combustion facilities* , August, EPA530-D-99-001A.
Sample et al., 1998, *Development and Validation of Bioaccumulation Models for Small Mammals,* ES/ER/TM-219.

Table 3-5

Bioaccumulation Factors Utilized
for the Sediment-to-Benthic Invertebrate Pathway
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

Constituent	PBOW Site-Specific BCFs [a]	Bechtel Jacobs (1998)			EPA (1999) BAF/BCF (dry weight)	Other BAF/BCF (dry weight)	Recommended BAF/BCF (dry weight)	Rationale for Recommended BAF/BCF
		Median BAF/BCF (dry weight)	90th Percentile BAF/BCF (dry weight)	Maximum BAF/BCF (dry weight)				
Inorganics								
Copper	0.13	1.556	5.25	23.87	1.8	--	0.13	Plum Brook site-specific BAF (IT, 2001)
Semivolatile Organics								
Benzo(a)anthracene	--	--	--	--	1.45	1.07/1.23 [c]	1.45	EPA (1999) BAF based on empirical data; based on benzo(a)pyrene
Benzo(a)pyrene	--	--	--	--	1.59	0.38/0.43 [c]	1.59	EPA (1999) BAF based on empirical data
Pyrene	--	--	--	--	--	1.3/1.49 [c]	1.3/1.49	Maruya et al. (1997) BAF based on empirical data

-- indicates that a BAF/BCF or regression equation is not available.
BAF - Bioaccumulation factor.
BCF - Bioconcentration factor.

[a] IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.

[c] Maruya, K. A., R. W. Risebrough, and A. J. Horne, 1997, *The bioaccumulation of polynuclear aromatic hydrocarbons by benthic invertebrates in an intertidal marsh* , Environmental Toxicology and Chemistry, 16: 1087 - 1097. The polycyclic aromatic hydrocarbon (PAH) biota-sediment accumulation factors (BSAF) for polychaetes or clams (naphthalene only) were averaged. The averaged values were then adjusted using the average percent lipid content in the study (polychaetes = 1.6%, clams = 1.1%) and site-specific organic carbon contents of 3.2% for Ash Pit 1 (average of two samples; first BAF) and 2.8% (one sample; second BAF) for Ash Pit 3. An adjustment was also made for converting the BSAFs from wet weight to dry weight (DW), assuming 83.3% moisture content. The final dry weight BAFs were calculated using the following equation:

$$\mathbf{BSAF_{DW} = Avg\ BSAF \times (Flipid/Foc) \times 1/(1 - \%\ moisture/100)}$$

References:

Bechtel Jacobs Company LLC, 1998, *Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation* , BJC/OR-112. (Depurated and nondepurated results used).

EPA, 1999, *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* , EPA530-D-99-001A (Peer Review Draft). **Note:** Only values based on empirical studies were used. Values were reported on a wet weight basis. Values were multiplied by 5.99 to convert to a dry-weight basis (see EPA, 1999).

Table 3-6

Bioaccumulation Factors and Regression Equations Utilized for the Surface Water-to-Fish Pathway Ash Pit 3 Plum Brook Ordnance Works, Sandusky, Ohio

Constituent	PBOW Site-Specific BCFs [a]	EPA (1999) BAF/BCF [b] (dry weight)	EPA (1989) BAF/BCF [c] (dry weight)	RAIS Database [d] (dry weight)	Regression Equation	Recommended BCF	Rationale for Recommended BAF/BCF
Inorganic Chemicals							
Manganese	247	--	--	2,000		247	Site specific BCF (IT, 2001)

-- indicates that a BAF/BCF or regression equation is not available.

BAF - Bioaccumulation factor.

BCF - Bioconcentration factor.

[a] Values are from IT, 2001. The listed BCF is the average of the West Area Red Water Pond reasonable maximum exposure value, and the average of the BCFs for the three aquatic organisms evaluated for the Pentolite Road area.

[b] Values are from EPA, 1999, adjusted to dry weight by multiplying by a factor of 5.

[c] Values are from EPA, 1989, and assumed to be in wet weight; adjusted to dry weight by multiplying by a factor of 5.

[d] Values are from Risk Assessment Information System (RAIS), current as of June 2010. Values were assumed to be in wet weight and were adjusted to dry weight by multiplying by a factor of 5.

References:

EPA, 1999, *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* , EPA530-D-99-001A (Peer Review Draft).

EPA, 1989, *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish* , EPA503-8-89-002.

IT Corporation (IT), 2001, *Redwater Pond Areas Baseline Ecological Risk Assessment, Plum Brook Ordnance Works, Sandusky, Ohio* , prepared for U.S. Army Corps of Engineers, Nashville District, April.

Table 4-1

Toxicity Reference Values for Mammals
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Inorganics								
Cadmium	--	1	rat	Sample, et al. (1996)	--	10	rat	Sample, et al. (1996)
Copper	--	11.7	mink	Sample, et al. (1996)	--	15.14	mink	Sample, et al. (1996)
Manganese	--	88	rat	Sample, et al. (1996)	--	284	rat	Sample, et al. (1996)
Thallium	--	0.0074	rat	Sample, et al. (1996)	--	0.074	rat	Sample, et al. (1996)
Explosives								
2,6-Dinitrotoluene	--	0.2	beagle dog	2,4-DNT as surrogate	--	1.5	beagle dog	2,4-DNT as surrogate
Semivolatile Organics								
Benzo(a)anthracene	--	1	mouse	Sample et al, (1996) B(a)P as surrogate	--	10	mouse	B(a)P as surrogate
Benzo(a)pyrene	--	1	mouse	Sample, et al. (1996)	--	10	mouse	Sample, et al. (1996)
Pyrene	75 (subchronic NOAEL)	7.5	mouse	LANL (2010)	--	37.5	mouse	LANL (2010)

REFERENCES

Los Alamos National Laboratory (LANL), 2010, ECORISK Database (Release 2.5), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, NM, October.

Sample, B. E., D. M. Opresko, and G. W. Suter II. 1996, Toxicological Benchmarks for Wildlife, 1996 Revision, Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Table 4-2

Toxicity Reference Values for Birds
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

COPEC	Toxicity Value	NOAEL (mg/kg/d)	Test Species	Reference	Toxicity Value	LOAEL (mg/kg/d)	Test Species	Reference
Inorganics								
Cadmium	--	1.45	mallard duck	Sample, et al. (1996)	--	20	mallard duck	Sample, et al. (1996)
Copper	--	47	chicks	Sample, et al. (1996)	--	61.7	chicks	Sample, et al. (1996)
Thallium	--	0.35	starling	LANL (2010)		3.5	starling	LANL (2010)
Explosives								
2,6-Dinitrotoluene	7	0.7	Bobwhite quail	2,4,6-TNT as surrogate; USACHPPM (2000)	178	17.8	Bobwhite quail	2,4,6-TNT as surrogate; USACHPPM (2000)
Semivolatile Organics								
Benzo(a)anthracene	7 (subchronic NOAEL)	0.7	Bobwhite quail	LANL (2010)	--	3.5	Bobwhite quail	LANL (2010)
Benzo(a)pyrene	--	1	chicken	EPA (1999)	--	5	chicken	EPA (1999)
Pyrene	--	39.5	chicken	Rigdon and Neal (1963)	--	395	chicken	Rigdon and Neal (1963)

REFERENCES

EPA, 1999, *Screening level ecological risk assessment protocol for hazardous waste combustion facilities*, August, EPA530-D-99-001A.

Los Alamos National Laboratory (LANL), 2010, ECORISK Database (Release 2.5), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, NM, October.

Sample, B. E., D. M. Opresko, and G. W. Suter II, 1996, *Toxicological Benchmarks for Wildlife, 1996 Revision,* Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Rigdon, RH and J Neal. 1963. *Absorption and Excretion of Benzo(a)pyrene, Observation in the Duck, Chicken, Mouse, and Dog*. Texas Rep. Biol. And Med. 21(2):247-261.

USACHPPM, 2000, *Standard Practice for Wildlife Toxicity Reference Values*, Environmental Health Risk Assessment Program and Health Effects Research Program, Aberdeen Proving Ground, Maryland, October.

Table 5-1

Wildlife Hazard Quotients for all Assessment Receptors
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

COPEC	Deer Mouse		Short-tailed Shrew		Cottontail Rabbit		Marsh Wren		White-tailed Deer		Raccoon		Red-Tailed Hawk		Muskrat	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Metals																
Cadmium	3.25E-01	3.25E-02	4.24E-01	4.24E-02	8.61E-03	8.61E-04	7.64E-01	5.54E-02	1.56E-05	1.56E-06	3.30E-04	3.30E-05	7.39E-06	NA	0.00E+00	0.00E+00
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-04	2.12E-04	0.00E+00	NA	3.36E-01	2.60E-01
Manganese	3.29E-04	1.02E-04	3.40E-04	1.05E-04	5.62E-05	1.74E-05	5.39E-05	5.39E-06	2.27E-07	7.04E-08	3.87E-06	1.20E-06	1.14E-08	NA	2.08E-04	6.43E-05
Thallium	**9.51E+00**	9.51E-01	**1.18E+01**	1.18E+00	5.25E-01	5.25E-02	7.13E-01	7.13E-02	2.26E-04	2.26E-05	1.38E-02	1.38E-03	6.28E-05	NA	0.00E+00	0.00E+00
Explosives																
2,6-Dinitrotoluene	1.79E-02	2.38E-03	9.42E-03	1.26E-03	3.18E-03	4.24E-04	3.27E-03	1.29E-04	6.36E-06	8.48E-07	1.36E-05	1.81E-06	1.08E-07	NA	0.00E+00	0.00E+00
Semivolatile Organics																
Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-05	1.45E-06	0.00E+00	NA	6.29E-03	6.29E-04
Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-05	1.71E-06	0.00E+00	NA	6.31E-03	6.31E-04
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-06	7.44E-07	0.00E+00	NA	5.93E-03	1.19E-03

COPEC - Chemical of potential ecological concern.
LOAEL - Lowest-observed-adverse-effect level.
NA - Because the red-tailed hawk represents a threatened and endangered species observed at the site (bald eagle), only hazard quotients based on the NOAEL are calculated.
NOAEL - No-observed-adverse-effect level.

Shaded cells indicate a hazard quotient greater than 1, when rounded.

FIGURES

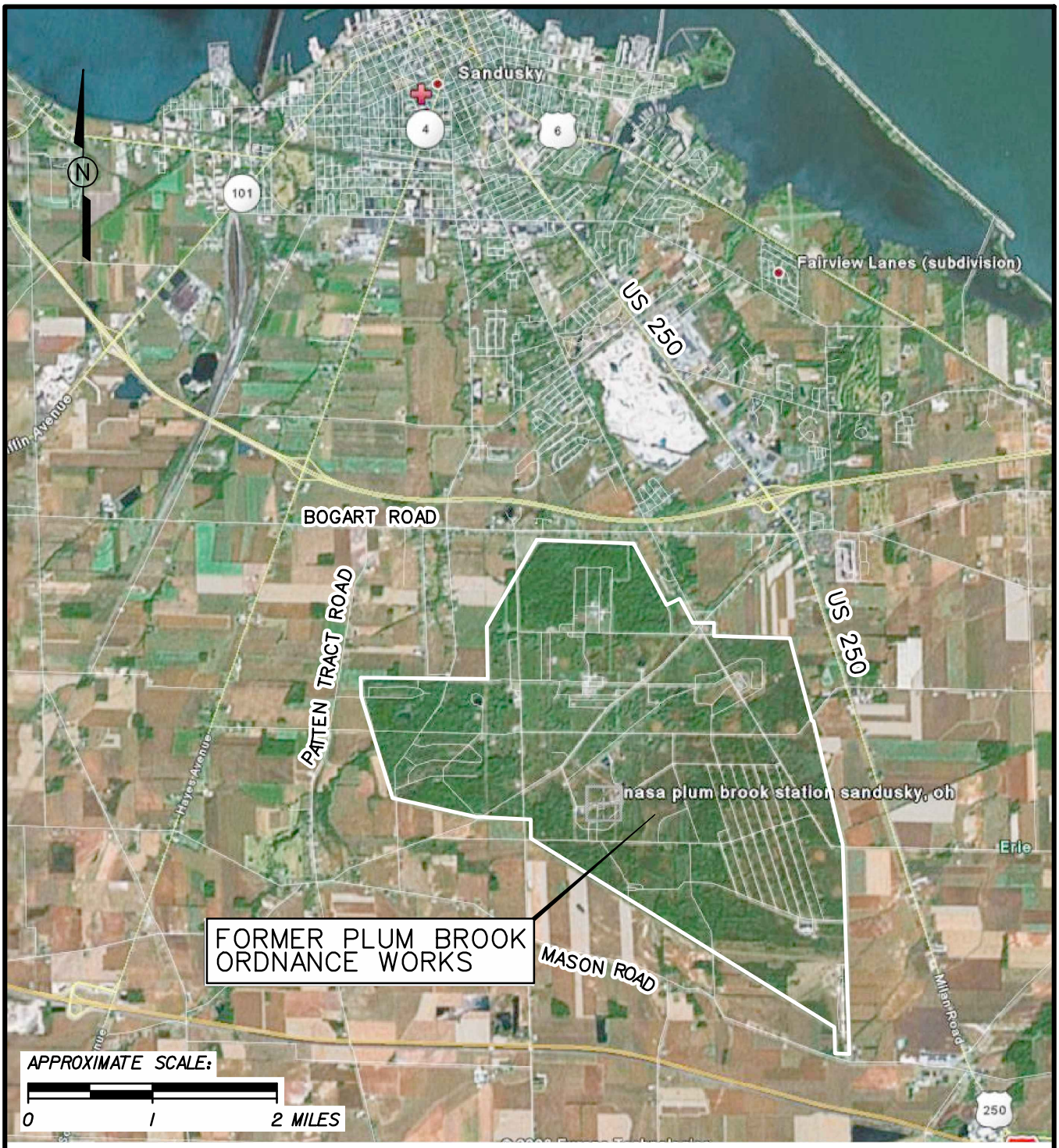

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT 3 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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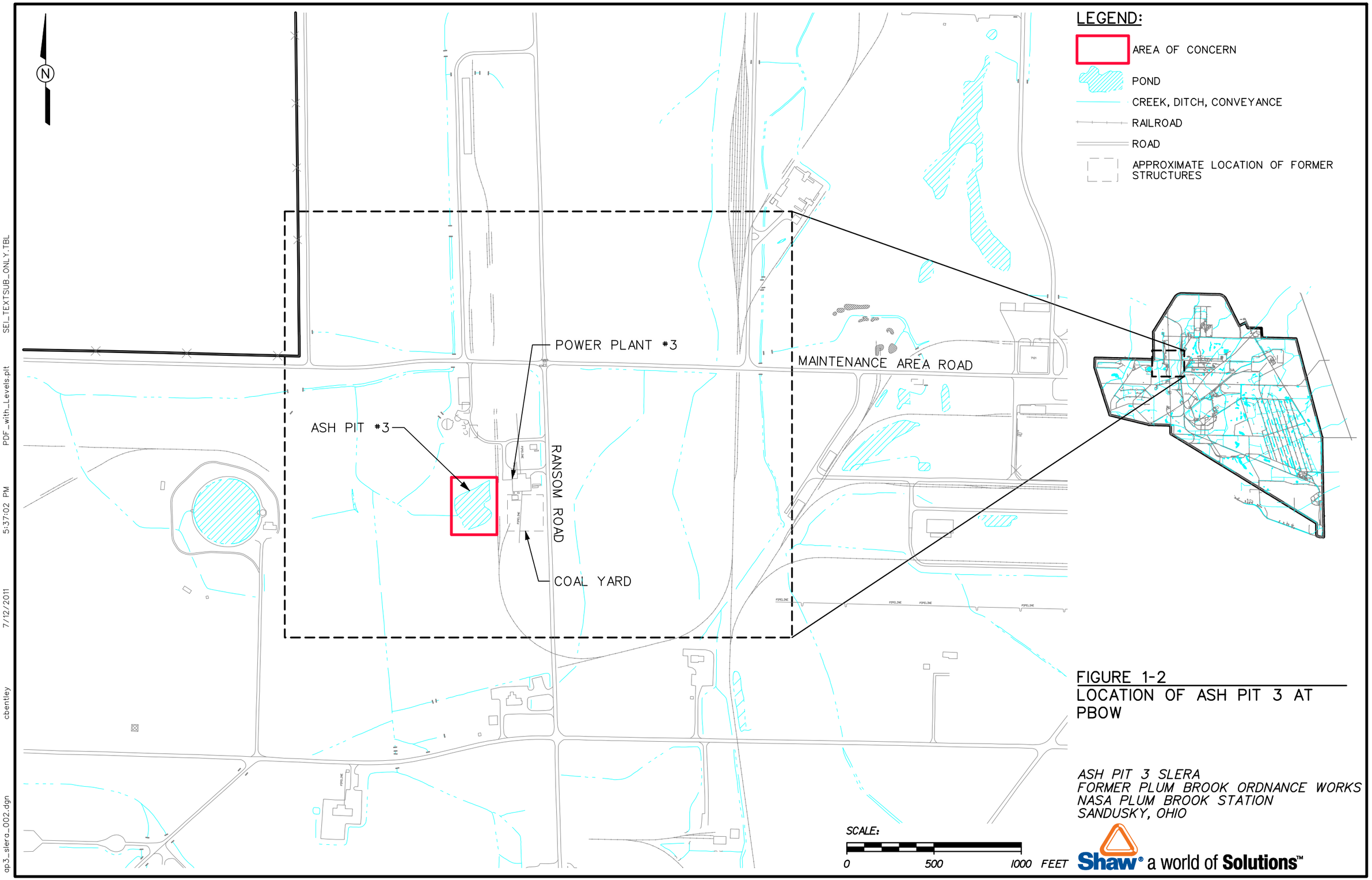

FIGURE 1-2
LOCATION OF ASH PIT 3 AT PBOW

ASH PIT 3 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw® a world of Solutions™

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Figure 2-1

Photo 1. Ash Pit 3. Vegetation on edge of ash pit (October, 2008).

Photo 2. Ash Pit 3. View of interior of ash pit depression (October, 2008).

Figure 2-1

Photo 3. Ash Pit 3. Drainage channel in southwest corner of ash pit (October, 2008).

Photo 4. Ash Pit 3. Ponded water in southwest corner of ash pit (October, 2008).

Figure 2-1

Photo 5. Ash Pit 3. Open area in middle of ash pit (June, 2009).

Photo 6. Ash Pit 3. Inundated area in the middle of the ash pit (April, 2009).

Figure 2-1

Photo 7. Ash Pit 3. Standing water and vegetation in ash pit (April, 2009).

Photo 8. Ash Pit 3. Bald eagle (circled) and nest in trees adjacent to ash pit (April, 2009).

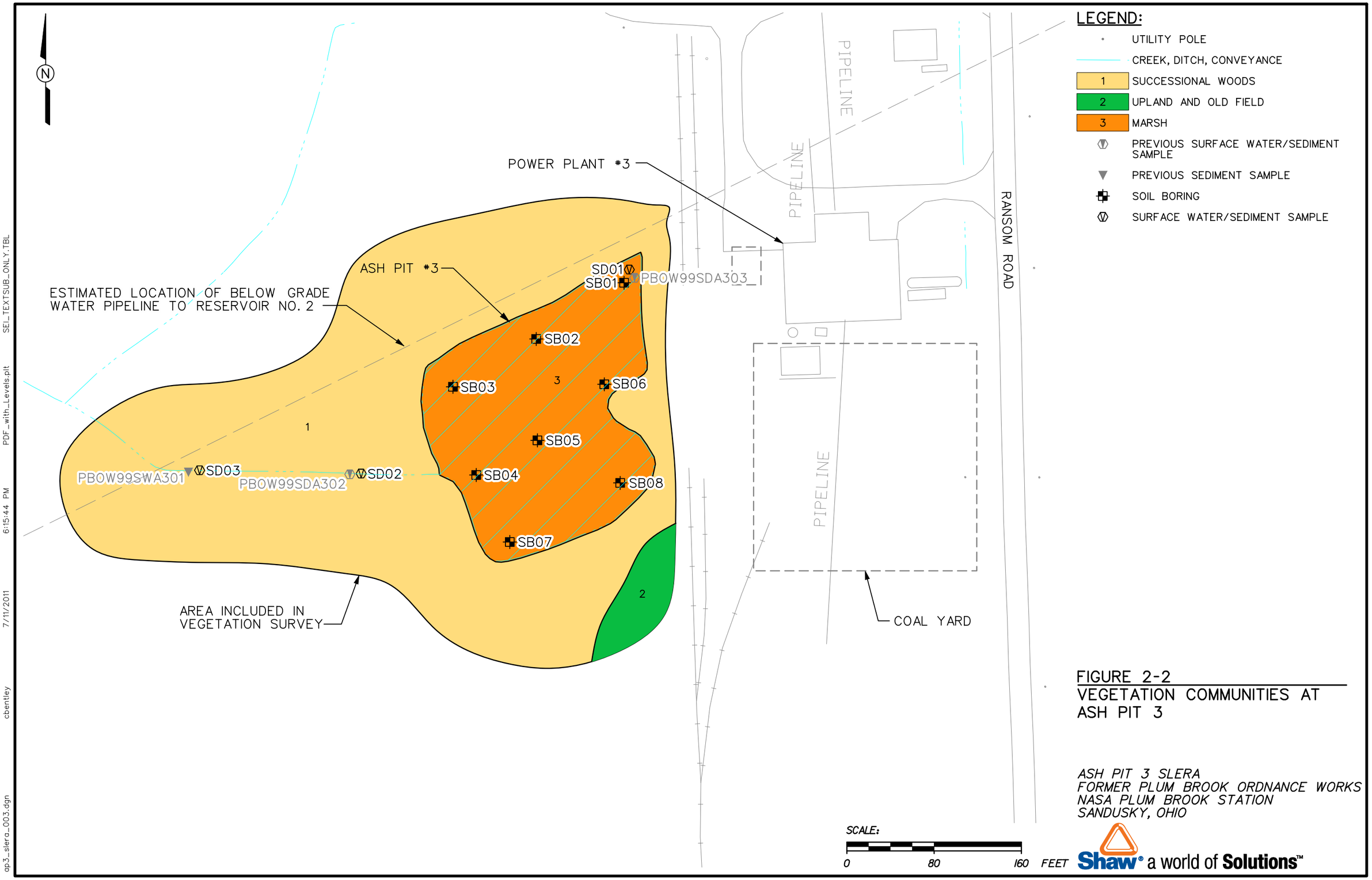

FIGURE 2-2
VEGETATION COMMUNITIES AT ASH PIT 3

ASH PIT 3 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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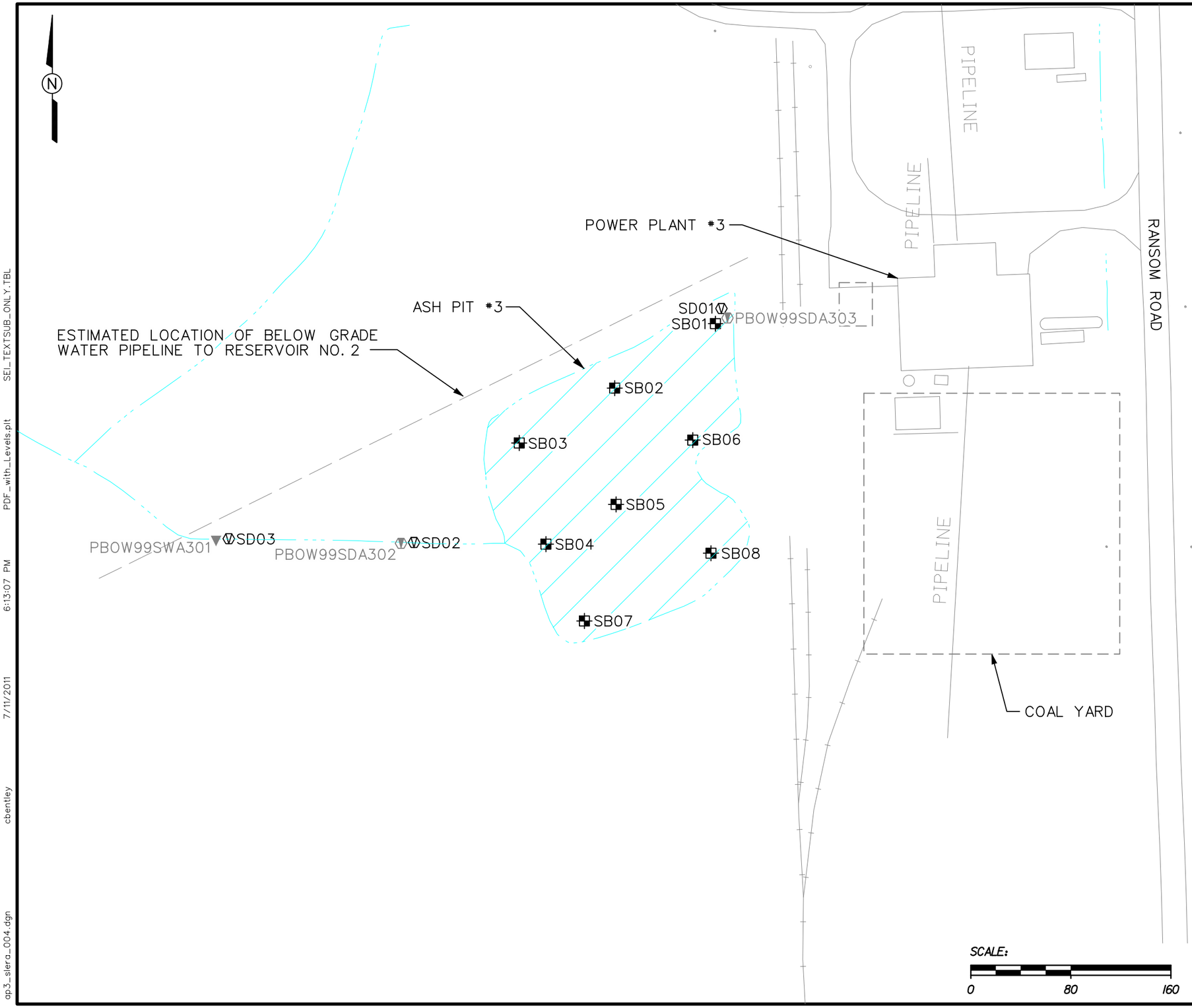

LEGEND:

- PREVIOUS SURFACE WATER/SEDIMENT SAMPLE
- PREVIOUS SEDIMENT SAMPLE
- SOIL BORING
- SURFACE WATER/SEDIMENT SAMPLE
- UTILITY POLE
- CREEK, DITCH, CONVEYANCE

SCALE:

0 80 160 FEET

FIGURE 2-3
ASH PIT 3 SITE MAP WITH SAMPLE LOCATIONS

ASH PIT 3 SLERA
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

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Figure 2-4

Simplified Terrestrial Food Web Conceptual Site Model (CSM)
Ash Pit 3, Plum Brook Ordnance Works
Sandusky, Ohio

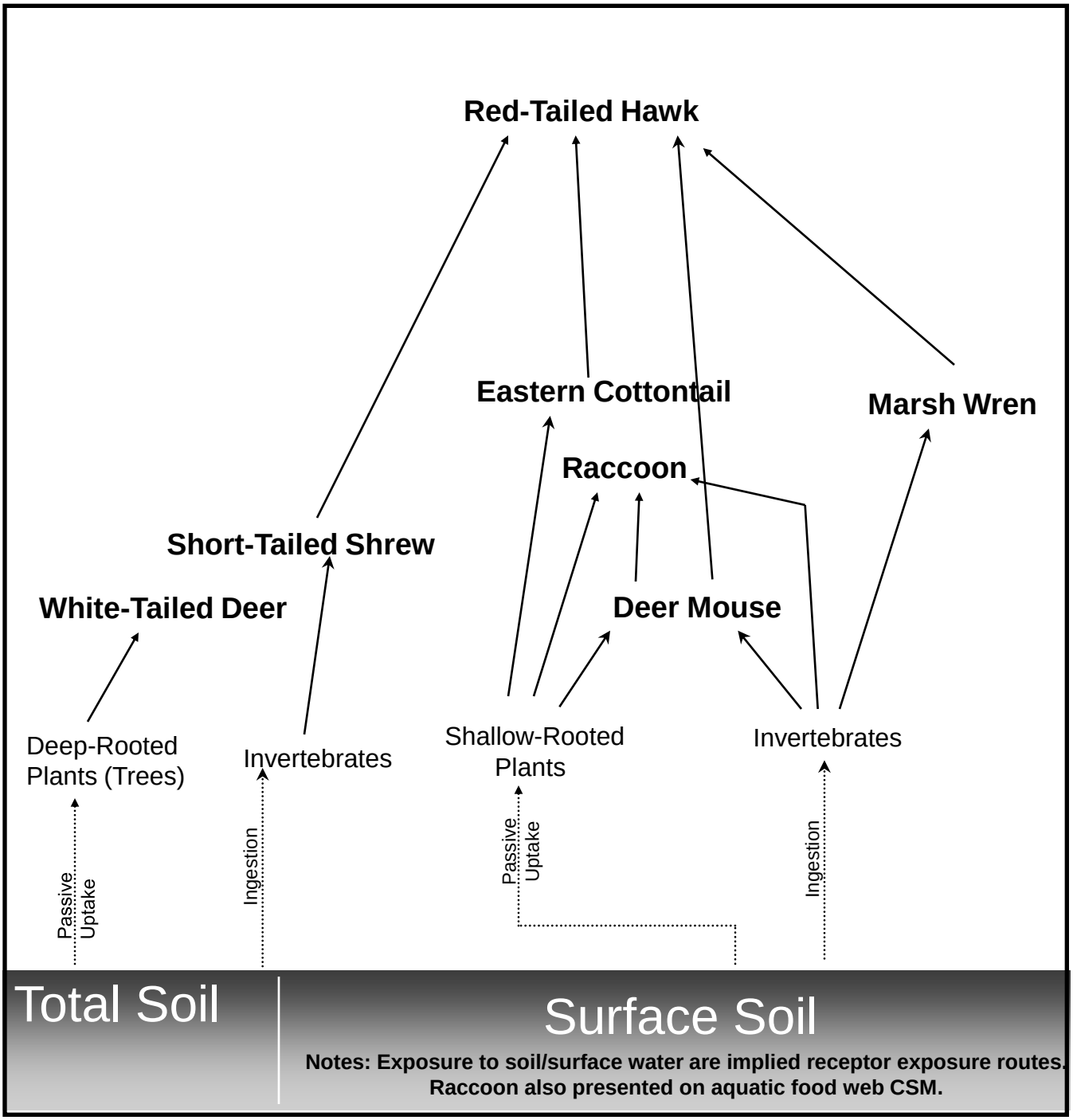
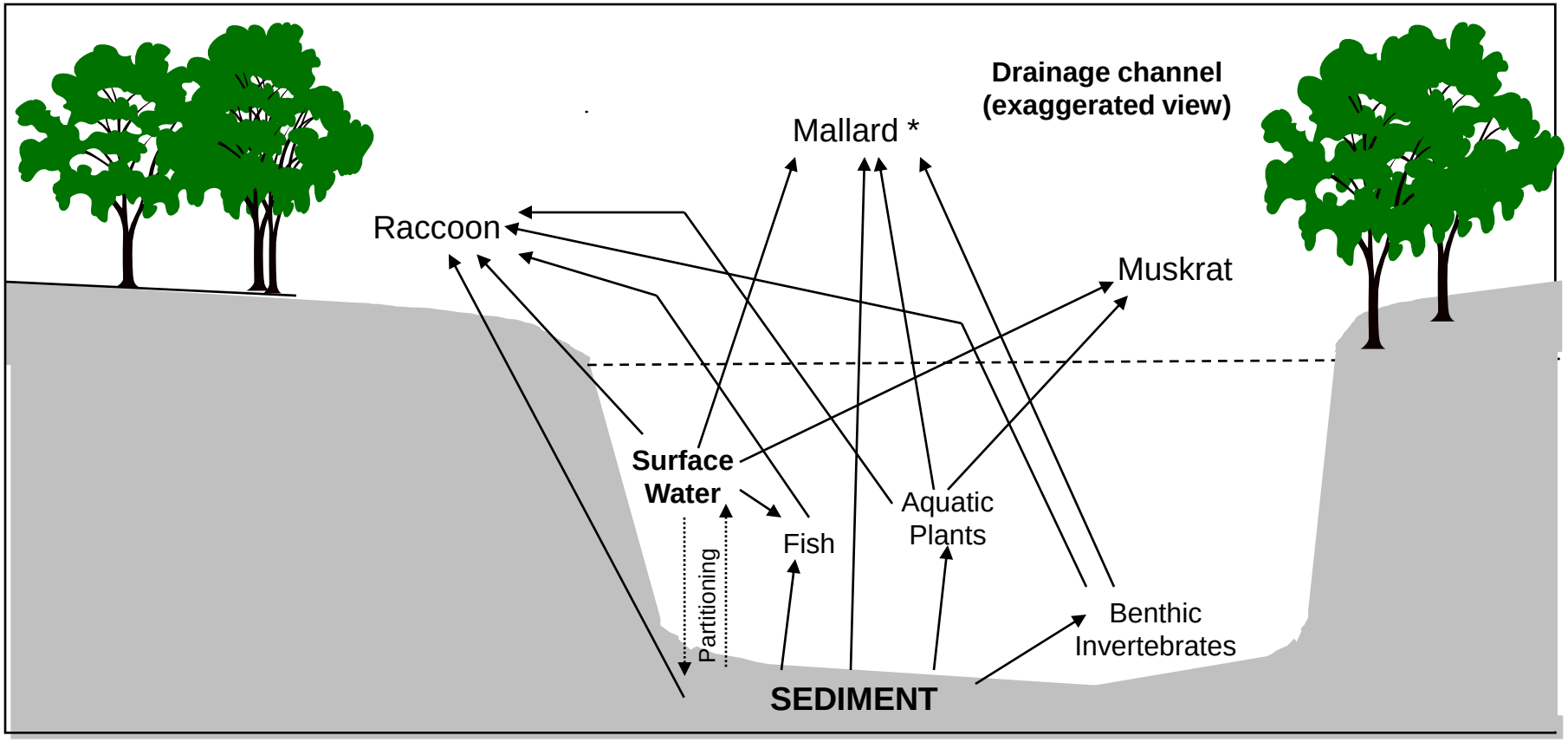


Figure 2-5

Simplified Aquatic Food Web Conceptual Site Model (CSM)
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

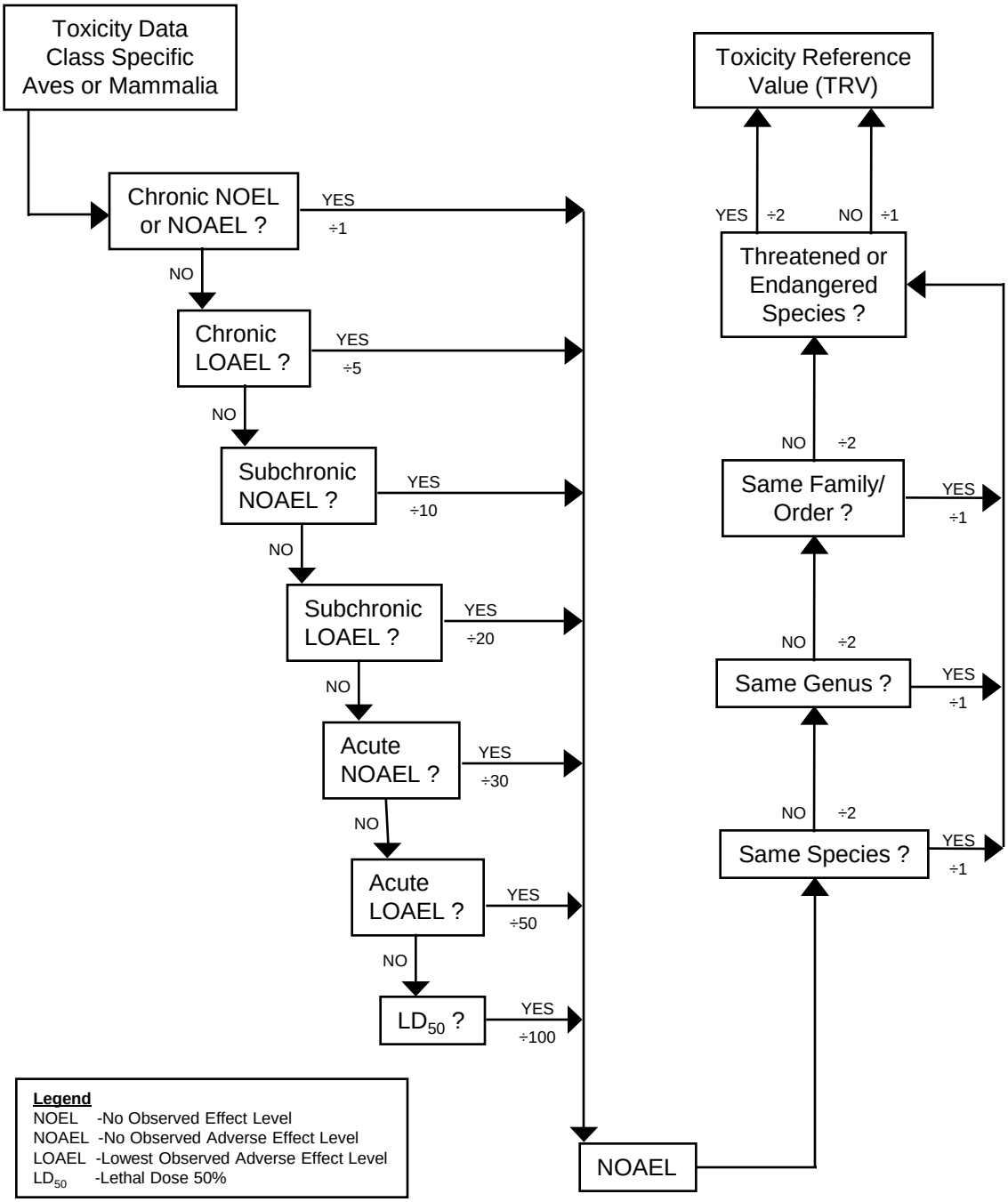


Note: The raccoon is also presented on terrestrial food web CSM.

*** = The mallard is not evaluated in the risk assessment.**

Figure 4-1

Procedural Flow Chart for Deriving Toxicity Reference Values from Class-Specific Toxicity Data Plum Brook Ordnance Works, Sandusky, Ohio



Credit: Adapted from Ford et al. (1992) in *Tri-Service Procedural Guidelines for Ecological Risk Assessments*, 1996

APPENDIX A

VASCULAR PLANT SPECIES DOCUMENTED ON SITE

Appendix A
Vascular Plant Species Documented On Site
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
**Acer platanoides*	Norway maple	Occasional		Disturbed woods	1
**Achillea millefolium*	Yarrow	Frequent		Dry fields, roadsides, and about buildings	1,2
**Agropyron repens*	Quack grass	Frequent		Old fields and roadsides	3
**Agrostis gigantea*	Redtop	Common		Moist fields, ditches, and roadsides	1,3
**Alliaria petiolata*	garlic mustard	Frequent		Dry to moist wood lots	1,3
**Andropogon virginicus*	broom-sedge	Occasional, frequent		Dry fields and roadsides	1,2
**Anthoxanthum odoratum*	vernal-grass	Occasional		Dry fields and openings, especially on shale	1
**Arabidopsis thaliana*	mouse-ear cress	Occasional		Road berms and about buildings	1
**Arctium minus*	Burdock	Occasional		Disturbed fields and about buildings	1
**Artemisia ludoviciana var. gnaphaloides*	white sage	Occasional		Grassy roadsides	1
**Berberis thunbergii*	Japanese barberry	Occasional, rare		Woodland borders	1
**Brassica nigra*	black mustard	Occasional		Roadsides	1
**Bromus inermis*	smooth brome	Frequent		Dry to moist fields and roadsides	1,2
**Bromus tectorum*	downy chess	Occasional		Dry openings and roadsides on shale	1
**Campsis radicans*	trumpet-vine	Occasional		Disturbed openings and roadsides	1
**Capsella bursa-pastoris*	shepherd's-purse	Occasional		Roadsides and about buildings	1,3
**Cardamine hirsuta*	bitter-cress	Occasional		Roadsides and about buildings	1
**Carduus nutans*	musk-thistle	Occasional, frequent		Dry fields and roadsides	1
**Cerastium fontanum*	mouse-ear chickweed	Frequent		Road berms and about buildings	1
**Cerastium semidecandrum*	NA	Occasional		Road berms and about buildings	1
**Chaenorrhinum minus*	dwarf snapdragon	Occasional		Road berms and about buildings	1
**Chrysanthemum leucanthemum*	ox-eye daisy	Frequent		Dry to moist fields and roadsides	1
**Cichorium intybus*	Chicory	Occasional		Roadsides	1,3
**Cirsium arvense*	Canada thistle	Common		Disturbed fields and roadsides	1,3
**Cirsium vulgare*	bull thistle	Frequent		Disturbed fields and roadsides	1,3
**Confolvulus arvensis*	field bindweed	Occasional		Disturbed fields and roadsides	1,3
**Convallaria majalis*	lilly-of-the-valley	Rare		Grassy field along Columbus Avenue	1
**Coronilla varia*	crown-vetch	Occasional, common		Grassy fields and roadsides	1,3
**Cyperus esculentus*	yellow nutgrass	Occasional, frequent		Moist, disturbed openings	1
**Dactylis glomerata*	orchard-grass	Occasional		Dry to moist fields and roadsides	1,3
**Daucus carota*	wild carrot	Frequent		Dry fields and roadsides	1
**Dianthus armeria*	Deptford pink	Occasional, rare		Dry openings and roadsides on shale	1
**Dipsacus fullonum*	common teasel	Frequent		Dry, disturbed openings and roadsides	1
**Draba verna*	early whitlow-wort	Occasional		Dry roadsides and about buildings	1
**Eleagnus umbellata*	autumn-olive	Occasional		Roadsides and woodland borders	1,2
**Elytrigia repens*	quack-grass	Frequent		Dry fields and roadsides	1
**Festuca elatior*	tall fescue	Occasional		Roadsides and grassy fields	1
**Festuca obtusa*	Fescue	Common		Old fields	3
**Glecoma hederacea*	ground-ivy	Frequent		Moist openings, roadsides, and about buildings	1,3
**Hieracium piloselloides*	king-devil	Frequent		Dry openings on shale, fields	1
**Hypericum perforatum*	dotted St. John's-wort	Frequent		Disturbed fields and roadsides	1
**Inula helenium*	Elecampane	Rare		Moist roadside along Taft Road	1
**Lamium purpureum*	dead-nettle	Frequent		Disturbed fields, roadsides, and about buildings	1
**Lepidium campestre*	field-cress	Occasional		Roadsides and about buildings	1
**Linaria vulgaris*	butter-and-eggs	Occasional		Roadsides and about buildings	1
**Lonicera maackii*	Amur honeysuckle	Rare		Roadsides and thickets along Columbus Avenue near Scheid Ditch	1
**Lonicera morrowii*	Asiatic honeysuckle	Frequent		Thickets, borders, and roadsides	1
**Lonicera tatarica*	Tatarian honeysuckle	Frequent, common		Thickets, borders, and roadsides	1,2
**Lotus corniculatus*	bird's-foot trefoil	Occasional		Grassy fields and road berms	1
**Matricaria matricarioides*	pineapple-weed	Occasional		Roadsides and about buildings	1
**Medicago lupulina*	Black medic	Occasional		Old fields and disturbed areas	3
**Melilotus alba*	white sweet-clover	Occasional, frequent		Disturbed fields and roadsides	1,3
**Melilotus officinalis*	yellow sweet-clover	Occasional		Disturbed fields and roadsides	1,3
**Najas minor*	Eurasian naiad	Frequent		Artificial ponds	1
**Nepeta cataria*	catnip	Occasional, frequent		Roadsides and weedy openings	1,3
**Oxalis europea*	Sorrel	Common		Old fields and disturbed areas	3
**Pastinaca sativa*	wild parsnip	Occasional		Roadsides	1
**Phleum pratense*	timothy	Frequent		Disturbed fields and roadsides	1,2
**Plantago lanceolata*	English plantain	Frequent		Disturbed openings and about buildings	1,3
**Plantago major*	broad-leaved plantain	Frequent		Road berms and about buildings (1) disturbed areas and old fields (2a)	1
**Poa annua*	early bluegrass	Common		Road berms and about buildings	1
**Poa compressa*	Canada bluegrass	Frequent		Dry openings, especially on shale, and roadsides	1,2

Appendix A
Vascular Plant Species Documented On Site
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[(a)]	Rank[(b)]	Habitat	Observed On Site[(c)]
**Polygonum caespitosum*	NA	Rare		Moist, shaded ground in bunker area	1
**Polygonum hydropiper*	water-pepper	Occasional		Margins of ponds	1,3
**Rosa multiflora*	multiflora rose	Occasional		Disturbed openings, borders, and thickets	1,2
**Rumex acetosella*	red sorrel	Occasional		Dry openings over shale	1
**Rumex crispus*	curly dock	Occasional		Roadsides and about buildings	1,2
**Saponaria officinalis*	soapwort	Frequent, occasional		Dry fields, roadsides, and about buildings	1
**Setaria faberi*	nodding foxtail-grass	Occasional, common		Grassy roadsides in the bunker area	1,3
**Setaria viridis*	green foxtail-grass	Frequent, common		Dry roadsides and about buildings	1
**Solanum caroliniense*	horse-nettle	Occasional, common		Dry openings and roadsides	1,2
**Solanum dulcamara*	bittersweet-nightshade	Occasional		Roadsides, ditches, thickets, and about buildings	1
**Stellaria media*	chickweed	Common		Road berms and about buildings	1
**Taraxacum officinalis*	dandelion	Frequent, occasional		Roadsides and about buildings	1,3
**Tragopogon pratensis*	Yellow goatsbeard	Rare		Old fields	3
**Trifolium pratense*	red clover	Occasional		Grassy fields and roadsides	1,3
**Trifolium repens*	common white clover	Common		Grassy roadsides and about buildings	1,3
**Verbascum blattaria*	moth-mullein	Occasional, rare		Disturbed fields and roadsides	1,3
**Verbascum thapsus*	common mullein	Frequent, occasional		Disturbed fields	1
**Veronica officinalis*	common speedwell	Occasional		Dry openings on shale	1
**Veronica serpyllifolia*	thyme-leaved speedwell	Occasional		Roadsides and about buildings	1
Acalypha rhomboidea	Three-seeded mercury	NA		NA	3
Acer negundo	box-elder maple	Frequent		Stream banks, ditches, and moist woods	1,2
Acer rubrum	red maple	Common		Dry to moist woods	1
Acer saccharinum	Silver maple	Rare		Dry to moist woods	3
Acer saccharum	Sugar maple	Occasional		Dry to moist woods	3
Acorus calamus	Sweet flag	Rare		Wet ditches	3
Agalinis purpurea	purple false-foxglove	Frequent		Moist openings and ditches	1
Agrimonia parviflora	southern agrimony	Frequent		Moist fields and ditches	1,2
Agrostis hyemalis	Ticklegrass	Occasional		Dry, grassy fields and shaley openings	1
Agrostis perennans	autumn bent-grass	Frequent		Dry woods and borders on shale	1
Ailanthus altissima	tree of heaven	NA		NA	3
Alisma plantago-aquatica	Water plantain	NA		NA	2
Alisma subcordatum	water-plantain	Occasional		Ponds and ditches	1,3
Allium canadense	Field garlic	NA		NA	3
Allium canadense	Wild garlic	Occasional		Successional woods	3
Ambrosia artemisiifolia	common ragweed	Frequent, occasional		Dry fields and roadsides	1,3
Ambrosia trifida	giant ragweed	Occasional		Dry fields and roadsides	1
Andropogon gerardii	big bluestem	Frequent, 0ccasional		Dry to moist fields and roadsides	1,3
Anemone virginiana	Thimbleweed	NA		NA	3
Antennaria parlinii	pussy-toes	Occasional		Dry fields and openings, especially on shale	1
Apios americana	Groundnut	NA		NA	3
Apocynum cannabinum	Dogbane	Frequent		Dry to moist fields and roadsides	1,3
Arctium minus	lesser burdock	NA		NA	3
Arenaria lateriflora	grove sandwort	Rare	T	Woods along Ransom Brook north of reactor	1
Arisaema triphyllum	Jack-in-the-pulpit	Rare		Moist to dry woods	3
Aristida dichotoma	Churchmouse grass	Occasional		Dry fields and openings	1
Aristida longespica	slimspike triple-awned grass	Common		Dry fields and openings	1
Aristida oligantha	prairie triple-awned grass	Occasional		Dry openings and roadsides	1
Asclepias hirtella	prairie milkweed	Common		Dry to moist openings	1
Asclepias incarnata	Swamp milkweed	Occasional		Wet ditches	3
Asclepias sullivantii	Sullivant's milkweed	Rare		Moist field along Patrol Road south of Scheid Road	1
Asclepias syriaca	common milkweed	Frequent		Dry to moist fields and roadsides	1,3
Asclepias tuberosa	butterfly-weed	Occasional		Dry openings and roadsides	1
Asparagus officinalis	asparagus	NA		NA	3
Aster ericoides	white heath aster	Rare, frequent		Grassy strip along Patrol Road southeast of Taft Road	1
Aster laevis	smooth aster	Rare		White oak grove on Taft Road	1
Aster lateriflorus	calico aster	Common, frequent		Moist woods and thickets	1,2
Aster novae-angliae	New England aster	Occasional		Dry fields and roadsides	1,3
Aster pilosus	common white aster	Common		Dry fields, roadsides, and about buildings	1
Aster sagittifolius	Arrow-leaved aster	Frequent		Woods and fields	3
Aster umbellatus	flat-top aster	Frequent, rare		Dry to moist fields and roadsides	1
Baptisia lactea	prairie false indigo	Occasional	P	Dry openings in bunker area	1
Baptisia tinctoria	yellow false indigo	Occasional		Dry openings in bunker area	1
Berberis thunbergii	Barberry	NA		NA	2
Bidens coronata	northern tickseed-sunflower	Common		Moist fields and ditches	1
Bidens frondosa	Beggar ticks	Rare		Ditches	2

Appendix A
Vascular Plant Species Documented On Site
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Boehmeria cylindrica	false nettle	Occasional		Ponds and ditches	1,2
Botrychium sp.	Grape fern	NA		NA	2
Botrychium virginianum	Rattlesnake fern	Occasional		Successional woods	3
Brassica nigra	mustard	NA		NA	3
Bromus pubescens	Brome	Occasional		Dry fields	3
Cacalia atriplicifolia	pale Indian-plantain	Occasional		Dry fields and roadsides; woods	1
Calamagrostis canadensis	blue-joint	Occasional		Moist fields and ditches	1
Callitriche heterophylla	water-starwort	Occasional		Pond margins and seasonally-moist depressions	1
Calystegia sepium	Hedge bindweed	Occasional		Fields	3
Carex aggregata	Glomerate sedge	NA		NA	2
Carex aggregata	sedge	Occasional		Moist woods	2
Carex alata	broad-winged sedge	Rare	P	Grassy field along Patrol Road south of Scheid Road, also in grassy strip between Patrol Road and artificial pond southeast of Taft Road	1
Carex albursina	White bear sedge	NA		NA	3
Carex amphibola	Eastern narrowleaf sedge	Occasional		Thickets and woods borders	2
Carex annectens var. annectens	NA	Occasional		Moist, grassy fields	1
Carex annectens var. xanthocarpa	yellow-fruited sedge	Occasional		Moist, grassy fields	1
Carex blanda	eastern woodland sedge	Frequent		Moist woods	1,2
Carex bromoides	Brome-like sedge	NA		NA	3
Carex cephaloidea	thin-leaf sedge	Rare	E	Woods border along Pentolite Road west of reactor	1
Carex complanata var. hirsutella	NA	Frequent		Dry fields and woods borders	1
Carex conoidea	field sedge	Rare	T	Grassy depression along Taft Road south of North Magazine Road	1
Carex cristatella	NA	Occasional		Moist fields and ditches	1
Carex festucacea	fescue sedge	Occasional		Moist, grassy fields	1
Carex frankii	Frank's sedge	NA		NA	3
Carex gracillima	NA	Occasional		Moist woods	1
Carex granularis	meadow sedge	Common		Moist, grassy fields and ditches	3
Carex hirtifolia	NA	Rare		Disturbed oak woods along angling road	1
Carex hystericina	Bottlebrush sedge	Rare		Moist depression along Taft Road	1
Carex pensylvanica	Pennsylvania sedge	Common		Dry woods	1
Carex radiata	Eastern star sedge	NA		NA	3
Carex rosea	NA	Frequent		Dry to moist woods	1
Carex scoparia	NA	Frequent		Moist, grassy fields	1
Carex sp.	sedges	NA		NA	2
Carex sparganoides	Bur-reed sedge	NA		NA	2
Carex stipata	NA	Frequent		Moist fields and ditches	1
Carex stricta	tussock sedge	Occasional		Moist fields and ditches	1
Carex swanii	Swan's sedge	Occasional		Dry, grassy fields	1
Carex tribuloides	Blunt broom sedge	Occasional		Moist, grassy fields and ditches	1,2
Carex umbellata	NA	Occasional		Well-drained, grassy fields on sandy soil	1
Carex vulpinoidea	fox sedge	Common		Moist fields, ditches, and about ponds	1,2
Carya cordiformis	Bitternut hickory	NA		NA	2
Carya ovata	shagbark hickory	Rare		Sandy soil along fence at far southeast boundary	1,3
Catalpa speciosa	Catalpa	NA		NA	3
Celastrus orbiculatus	Bittersweet	Occasional		Thickets and woods borders	3
Celtis occidentalis	Hackberry	Occasional		dry to moist woods and borders	1,2
Cephalanthus occidentalis	Buttonbush	Occasional		Moist depressions and ditches	1,3
Cerastium arvense	field chickweed	Rare		White oak grove along Taft Road	1
Chamaecrista fasciculata	partridge-pea	Occasional		Dry openings on shale	1
Chenopodium album	lamb's quarters	NA			3
Cinna arundinacea	Wood reed grass	Occasional		Woods	3
Circaea lutetiana	Southern broad-leaved enchanter's nightshade	Frequent		Woods	2
Cirsium arvense	creeping thistle	NA		NA	3
Cirsium discolor	prairie thistle	Frequent, occasional		Grassy fields and roadsides	1
Clematis virginiana	Virgin's bower	NA		NA	3
Clinopodium vulgaris	wild basil	Occasional		Dry roadsides and openings	1,2
Conyza canadensis	Horseweed	Frequent		Dry fields and roadsides	1,3
Cornus amomum	swamp dogwood	Frequent, occasional		Moist fields and thickets	1
Cornus drummondii	rough-leaved dogwood	Frequent		Moist borders, thickets, and roadsides	1.3
Cornus florida	flowering dogwood	Occasional		Woodland borders and roadsides	1
Cornus racemosa	gray dogwood	Frequent		Dry fields and roadsides	1,2

Appendix A
Vascular Plant Species Documented On Site
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Crataegus mollis	downy hawthorn	Frequent		Thickets and woodland borders	1
Crataegus punctata	dotted hawthorn	Frequent		Thickets and woodland borders	1
Cryptotaenia canadensis	honewort	Occasional, rare		Dry to moist woods	1
Cuscuta gronovii	dodder	Frequent		Moist fields and ditches	1
Cyperus esculentus	Chufa	NA		NA	2
Cyperus flavescens	Umbrella sedge	occasional		Old fields and waste places	3
Cyperus strigosus	umbrella-sedge	Frequent		Moist openings, ponds, and ditches	1,3
Danthonia spicata	poverty-grass	Occasional		Dry openings over shale	1
Datura stramonium	jimson-weed	Occasional		Disturbed openings and roadsides	1
Daucus carota	Queen Anne's lace	NA		NA	3
Desmodium canescens	Tick trefoil	Occasional		Fields	2
Dichanthelium dichotomum	cypress panic grass	NA		NA	3
Digitaria cognatum (Leptoloma cognatum)	NA	Occasional		Old fields	3
Digitaria ischaemum	smooth crabgrass	NA		NA	3
Diodia teres	buttonweed	Occasional		Dry openings over shale	1
Dioscorea villosa	Yam root	NA		NA	2
Dipsacus sylvestris	teasel	NA			3
Dryopteris carthusiana	spinulose woodfern	Frequent		Moist woods and shaded borders	1
Eleocharis acicularis	needle spikerush	Frequent		Margins of artificial pond	1
Eleocharis erythropoda	red-footed spikerush	Occasional		Moist openings and ditches	1
Eleocharis obtusa	NA	Common		Moist openings and ditches	1
Eleocharis smallii	Small's spikerush	Frequent		Margins of artificial pond	1
Eleocharis sp.	Spike rush				2
Eleocharis tenuis	NA	Frequent		Moist openings and ditches	1
Elymus sp.	Rye grass	NA		NA	2
Elymus virginica	Wild rye	Occasional		Moist to dry woods	3
Epilobium coloratum	purple-leaved willow herb	NA		NA	2
Equisetum arvense	horsetail	Frequent		Moist openings, roadsides, and ditches	1,2
Equisetum hyemale	scouring-rush	Occasional		Moist roadsides and ditches	1,3
Eragrostis frankii	NA	Occasional		Moist openings and ditches	1
Eragrostis spectabilis	showy lovegrass	Occasional		Dry to moist fields	1
Erechtites hieracifolia	Pilewort	Common		Disturbed woods, borders, and roadsides	1,2
Erigeron anuus	Fleabane	NA		NA	2
Erigeron philadelphicus	Philadelphia fleabane	Frequent, occasional		Roadsides and borders	1
Erigeron strigosus	smooth fleabane	Occasional		Dry openings and roadsides	1
Eupatorium perfoliatum	Boneset	Occasional, frequent		Moist fields, ponds, and ditches	1,2
Eupatorium purpureum	purple joe-pye-weed	Occasional		Borders of moist woods, fields	1,3
Eupatorium rugosum	White snake root	Common		Woods and fields	2
Eupatorium sessilifolium	Upland boneset				3
Euphorbia corollata	Flowering spurge	Occasional		Dry fields	1
Euphorbia maculata	Prostrate spurge	Occasional		Dry openings, road berms, and about buildings	1,3
Euphorbia supina	Milk purslane	NA		NA	3
Euthamia graminifolia	grass-leaved goldenrod	Common		Dry to moist fields and roadsides	1,2
Fragaria virginiana	wild strawberry	Frequent		Dry to moist fields and roadsides	1,2
Fraxinus americana	white ash	Frequent		Dry to moist woods and borders	1
Fraxinus pensylvanica	green ash	Frequent, common		Moist woods and stream banks	1,2
Galine aparine	Cleavers	Occasional		Moist woods and borders	1,3
Galium asperellum	Rough bedstraw	NA		NA	2
Galium circaezans	wild licorice	Rare		Dry woods	1
Galium tinctorium	Southern bedstraw	Rare		Moist depression along Taft Road	1,2
Gentianopsis crinita	Fringed gentian	Occasional	P	Old fields along ditch banks, small groups and scattered individuals in northeast portion of TNT area A	3
Geranium maculatum	Wild geranium	Occasional		Successional woods	3
Gerardia tenuifolia	Slender gerardia	Frequent		Disturbed fields	3
Geum laciniatum	Rough avens				2
Geum vernum	spring avens	Occasional		Moist woods and borders	1
Geum virginianum	white avens	Occasional		Woods borders and roadsides	1
Gleditsia triacanthos	honey-locust	Occasional, rare		Dry to moist woods and borders	1,2
Glyceria striata	manna-grass	Occasional		Moist woods and about ponds	1,3
Gnaphalium obtusifolium	Cudweed	Frequent, occasional		Dry openings on shale, fields	1,3
Gratiola virginiana	round-fruited hedge-hyssop	Rare	P	ca 20 plants; moist, shaded ground by pond west of Snake Road	1
Hackelia virginiana	Virginia stickseed	Rare		Woods	3
Hedyotis caerula	Bluets	Occasional		Dry openings and roadsides on shale	1

Appendix A
Vascular Plant Species Documented On Site
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Helenium autumnale	Sneezeweed	Occasional		Disturbed fields	3
Helenium flexuosum	Southern sneezeweed	Occasional		Moist, open ground and ditches	1
Helianthus mollis	ashy sunflower	Rare	T	ca 200 plants in grassy field south and southwest of junction of Fox and Patrol Roads; the exact number of individuals in this population is uncertain since excessive browsing by deer has reduced the plants to leafy tufts.	1
Helianthus tuberosus	Jerusalem artichoke	Occasional		Old fields	3
Hemerocallus fulva	Daylily	NA		NA	3
Hesperis matronalis	Dame's rocket	NA		NA	3
Hibiscus moscheutos	rose-mallow	Rare		Moist swale along Ransom Road	1
Hypericum gentianoides	orange-grass	Frequent		Dry openings	1
Hypericum gymnanthum	least St. John's-wort	Rare	E	ca 50 plants; moist, open ground along Patrol Road south of Fox Road	1
Hypericum majus	tall St. John's-wort	Rare	P	Moist, shaded ground by pond west of Snake Road	1
Hypericum mutilum	little St. John's-wort	Frequent		Moist openings, ponds, and ditches	1
Hypericum perforatum	common St. John's wort	NA			3
Hypericum punctatum	St. Johns wort	Rare		Fields	3
Hypoxis hirsuta	yellow-eyed-grass	Occasional		Grassy fields	1
Hystrix patula	Bottlebrush grass	Occasional		Woods	3
Impatiens capensis	Jewelweed	NA		NA	3
Ipomoea pandurata	wild sweet-potato	Occasional		Dry openings over shale	1
Ipomoea purpurea	common morning glory	NA		NA	3
Iris versicolor	Northern blue flag	Occasional		Moist woods and ditches	1
Isanthus brachiatus	false pennyroyal	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Juglans nigra	black walnut	Rare		A few young trees at edge of grassy field southwest of junction of Fox and Patrol Roads, woods (2b)	1
Juncus acuminatus	NA	Common		Moist openings and ditches	1
Juncus biflorus	NA	Occasional		Moist openings and ditches	1
Juncus brachycarpus	NA	Occasional		Moist openings	1
Juncus canadensis	Canada rush	Frequent		Moist openings	1
Juncus dudleyi	Dudley's rush	Frequent		Moist openings	1
Juncus effusus	Common rush	Frequent		Moist openings, ponds, and ditches	1,2
Juncus marginatus	NA	Occasional		Moist openings	1
Juncus nodosus	rush	Occasional		Old fields and ditches	3
Juncus tenuis	path rush	Frequent, occasional		Dry openings, road berms, and about buildings	1
Juncus torreyi	Torrey's rush	Occasional		Moist fields	3
Juniperus virginiana	Red cedar	NA		NA	2
Laportea Canadensis	Wood nettle	NA		NA	3
*Lathyrus latifolius**	Everlasting pea	Occasional		Old fields	3
Leersia oryzoides	rice cutgrass	Occasional		Moist fields and ditches	1,2
Leersia virginica	White grass	NA		NA	2
Lemna minor	Lesser duckweed	Occasional		Ponds and standing water	1,2
Lepidium campestre	field peppergrass	NA		NA	3
Lepidium virginicum	poor man's pepper	Frequent		Roadsides, disturbed openings, and about buildings	1
Leptoloma cognatum	fall witch grass	NA		NA	3
Lespedeza capitata	bush-clover	Occasional		Dry fields	1
Leucospora multifida	NA	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Liatris scariosa var. novae-angliae	northern blazing-star	Rare		Dry ground along Patrol Road at Olemacher Ditch	1
Liatris spicata	spiked blazing-star	Occasional		Moist openings	1
Lindernia dubia	false pimpernel	Occasional		Moist openings, ditches, and pond margins	1
Linum medium	wild flax	Frequent		Dry to moist openings	1
Linum virginianum	Virginia flax	Rare		About pond in northern bunker area	1
Lobelia siphilitica	Great lobelia	Frequent		Moist fields	3
Lonicera japonica	Japanese honeysuckle	Occasional		Fields and disturbed areas	3
Ludwigia alternifolia	rattlebox	Occasional		Ponds and ditches	1
Ludwigia palustris	water-purslane	Frequent, occasional		Ponds and ditches	1
Ludwigia polycarpa	NA	Rare		Moist, shaded ground by pond on Snake Road	1
Lycopus americana	American bugleweed				2
Lycopus americanus	American water-horehound	Frequent		Ponds and ditches	1,3
Lycopus uniflorus	northern water-horehound	Frequent		Moist woods and shaded borders	1
Lycopus virginicus	Virginia bugleweed				3

Appendix A
Vascular Plant Species Documented On Site
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Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Lysimachia terrestris	swamp loosestrife	Occasional		Moist openings	1,3
Lythrum alatum	prairie loosestrife	Occasional		Moist openings	1
Lythrum salicaria	Purple loosestrife				3
Maclura pomifera	osage-orange	Occasional		Disturbed woods and borders	1,3
Melilotus sp.	Sweet clover				2
Mentha piperita	peppermint	NA		NA	2
Mentha spicata	Spearmint	Occasional		Moist fields	3
Mimulus ringens	monkey-flower	Occasional, rare		Moist openings and ditches	1,2
Monarda fistulosa	bergamont	Occasional		Grassy fields	1
Monarda sp.	bee balm	NA		NA	3
Morus alba	Mulberry	Occasional		Fields and thickets	3
Muhlenbergia frondosa	muhly grass	Frequent		Moist fields and ditches	1
Myrica pensylvanica	Bayberry	Rare	E	One individual in old field in northern portion of area	3
Najas flexilis	northern naiad	Occasional		Artificial ponds	1
Nyssa sylvatica	blackgum	Occasional		Thickets and woods borders	1
Oenothera biennis	evening-primrose	Frequent		Dry fields, roadsides, and about buildings	1
Oenothera tetragona	northern sundrops	Frequent		Moist, grassy fields	1
Onoclea sensibilis	Sensitive fern	frequent		Wet areas	2
Osmunda cinnamomea	cinnamon fern	Rare		Depressions in moist woods along angling road	1
Osmunda regalis	royal fern	Occasional		Depressions in moist woods	1
Oxalis stricta	sorrel	NA		NA	3
Oxalis violacea	purple wood-sorrel	Occasional		Drier oak woods and borders on shale	1
Panicum capillare	witchgrass	NA		NA	3
Panicum clandestinum	deer tongue grass	NA		NA	2
Panicum dichotomiflorum	Panic grass	Frequent		Fields	2
Panicum flexile	wiry witch-grass	Rare		Moist opening on limestone, west of Snake Road and south of North Magazine Road	1
Panicum lanuginosum	hairy panic-grass	common		Dry, grassy fields and roadsides	1
Panicum oligosanthes	sand panic-grass	Occasional		Dry, grassy fields	1
Panicum rigidulum	stiff panic-grass	Frequent		Moist openings and ditches	1
Panicum virgatum	switch-grass	Occasional		Dry fields	1,3
Parietaria pensylvanica	pellitory	Occasional		Dry, disturbed wood lots and borders	1
Paronychia fastigata	forked chickweed	Occasional		Dry woods and borders on shale	1
Parthenocissus quinquefolia	Virginia-creeper	Occasional		Dry to moist woods borders and thickets	1,2
Parthenocissus vitacea	grape-woodbine	Rare		Dry opening north of Center Magazine Road	1
Penstemon digitalis	tall white beard-tongue	Frequent		Grassy fields and roadsides	1,3
Phalaris arundinacea	reed canary-grass	Common		Moist fields and ditches	1,3
Phragmites australis	reed-grass	Occasional, rare		Moist openings and ditches	1,2
Phryma leptostachya	lopseed	Rare		Edge of woods along Scheid Ditch near Columbus Avenue; successional woods	1
Phytolacca americana	pokeberry	Occasional, rare		Moist woods and borders	1,3
Pilea pumila	clearweed	NA		NA	2
Plantago major	common plantain	NA		NA	3
Platanthera lacera	ragged fringe-orchid	Rare		Ditch along south Patrol Road	1
Platanus occidentalis	sycamore	Occasional, frequent		Moist woods and stream banks, fields and waste areas	1,3
Poa pratensis	Kentucky bluegrass	NA		NA	2
Podophyllum peltatum	may-apple	Occasional		Dry to moist woods	1,2
Polygala sanguinea	blood milkwort	Frequent		Moist openings	1
Polygala verticillata	whorled milkwort	Occasional		Moist openings	1
Polygonum hydropiper	Smartweed	NA		NA	2
Polygonum hydropiperoides	false water-pepper	Occasional		Wet ditches and pond margins	1
Polygonum pennsylvanicum	Pennsylvania smartweed	NA		NA	3
Polygonum sagittatum	arrow-leaved tearthumb	Occasional		Moist thickets and ditches	1
Polygonum scandens	climbing false buckwheat	Occasional		Thickets and roadsides	1
Polygonum sp.	Smartweed	NA		NA	2
Polygonum virginianum	Virginia knotweed	Common		Moist to dry woods	2
Populus deltoides	cottonwood	Frequent, common		Moist woods, borders, and stream banks	1,2
Potamogeton diversifolius	snailseed pondweed	Frequent		Artificial ponds	1
Potamogeton foliosus	leafy pondweed	Occasional		Artificial ponds	1
Potamogeton nodosus	longleaf pondweed	Occasional		Artificial ponds	1
Potamogeton pectinatus	Sago pondweed	NA		NA	3
Potentilla simplex	cinquefoil	Frequent		Dry openings and roadsides on shale	1
Prunella vulgaris	self-heal	Occasional, frequent		Roadsides and about buildings	1,3
Prunus americana	wild plum	Occasional		Thickets and roadsides	1

Appendix A
Vascular Plant Species Documented On Site
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Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Prunus serotina	wild black cherry	Frequent, common		Dry to moist woods and borders	1,2
Pycnanthemum tenuifolium	narrow-leaved mountain-mint	Frequent, common		Moist openings, especially on shale, old fields	1,3
Pycnanthemum virginianum	Virginia mountain-mint	Occasional		Moist openings and ditches	1
Pyrus coronaria	crab-apple	Frequent		Thickets and borders	1,3
Quercus alba	white oak	Occasional		Dry woods and sandy ridges; a small grove on Taft Road has an unusually pure stand of this species	1
Quercus bicolor	swamp white oak	Frequent		Moist woodlands	1
Quercus imbricaria	shingle oak	Frequent, occasional		Moist to dry woodlands	1,3
Quercus macrocarpa	bur oak	Rare		ca 5 trees on sandy ridge in bunker area south of North Magazine Road; a few trees in area 2a	1
Quercus palustris	pin oak	Common, frequent		Moist woods	1,3
Ranunculus acris	Field buttercup	NA		NA	2
Ranunculus sceleratus	cursed crowfoot	NA		NA	3
Ratibida pinnata	green-headed coneflower	Occasional, frequent		Roadsides and dry fields	1
Rhexia virginica	Virginia meadow-beauty	Occasional	P	Moist openings and pond margins, south of North Magazine Road and along the angling road	1
Ribes americanum	American currant	NA		NA	3
Ribes cynosbati	Gooseberry	Rare		Woods	3
Riccia sp.	liverwort	NA		NA	3
Robinia pseudoacacia	Black locust	Rare		Old fields and thickets	3
Rosa carolina	pasture rose	Occasional		Dry fields	1
Rosa setigera	prairie rose	Rare		Grassy roadside and thickets along Patrol Road at Olemacher Ditch	1,2
Rotala ramosior	toothcup	Occasional		Moist openings and about ponds	1
Rubus allegheniensis	blackberry	Common		Woods, fields, and borders	2
Rubus flagellaris	dewberry	Frequent, common		Dry openings and roadsides on shale, old fields	1,3
Rubus occidentalis	Black raspberry	common		Dry woods, and borders	2
Rudbeckia hirta	black-eyed susan	Frequent		Dry fields and roadsides	1
Rumex acetosella	sheep sorrel	NA		NA	3
Rumex verticillatus	Swamp dock	Rare		Ditches	2
Sagittaria latifolia	broad-leaved arrowhead	Occasional		Ponds and ditches	1
Salix amygdaloides	peachleaf willow	Occasional		Ditches and about ponds	1,2
Salix discolor	pussy willow	Occasional		Moist openings, ponds, and ditches	1,3
Salix exigua	sandbar willow	Frequent		Moist openings, stream banks, and ditches	1,3
Salix nigra	black willow	Common		Moist woods, stream banks, and ditches	1,2
Salix sp.	Willow				3
Sambucus canadensis	elder-berry	Frequent, occasional		Moist openings, stream banks, and ditches	1,3
Sassafras albidum	sassafras	Occasional		Dry woods and borders	1
Schizachyrium scoparium	little bluestem	Frequent		Dry fields and roadsides	1
Scirpus acutus	hardstem bulrush	Rare		Moist depression west of Taft Road	1
Scirpus americanus	Three square	rare		Ditches	3
Scirpus atrovirens	dark green bulrush	Common, occasional		Moist openings, roadsides, and ditches	1,2
Scirpus cyperinus	woolgrass	Occasional		About artificial ponds	1,2
Scirpus fluviatilis	river bulrush	Rare		Moist depression west of Taft Road	1
Scirpus pendulus	NA	Occasional		Moist openings	1
Scirpus polyphyllus	Leafy bulrush				3
Scirpus validus	softstem bulrush	Occasional		Moist openings, ponds, and ditches	1,2
Scleria triglomerata	tall nut-rush	Rare	P	Moist swale in northern bunker area	1
Scutellaria lateriflora	mad-dog skullcap	Occasional		Moist depressions and ditches	1,2
Senecio aureus	golden ragwort	Occasional		Moist woods borders	1
Setaria faberi	foxtail	NA		NA	3
Setaria glauca	Yellow foxtail-grass	NA		NA	3
Silphium terebinthinaceum	prairie-dock	Rare		Dry openings at crossing of Patrol Road and Olemacher Ditch	1
Sisyrinchium albidum	prairie blue-eyed-grass	Frequent		Grassy fields	1
Sisyrinchium angustifolium	common blue-eyed-grass	Frequent		Grassy fields	1
Solanum nigrum	Black nightshade	Occasional		Fields and waste areas	3
Solidago canadensis	Canada goldenrod	Common		Grassy fields	1,2
Solidago juncea	early goldenrod	Frequent		Dry to moist fields and roadsides	1
Solidago nemoralis	gray goldenrod	Common		Dry fields and roadsides	1
Solidago riddellii	Riddell's goldenrod	Rare		Moist opening over limestone, west of Snake Road and south of North Magazine Road	1
Sparganium eurycarpum	giant bur-reed	Rare		Wet ditch along Ransom Road	1
Spartina pectinata	prairie cord-grass	Frequent, occasional		Moist depressions, fields, and ditches	1
Spenopholis intermedia	slender wedgescale	NA		NA	3
Spiranthes ochroleuca	creamy ladies'-tresses	Occasional, rare		Ditches and moist openings	1
Sporobolus asper	tall dropseed	Rare		A single stand in dry opening along angling road	1

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Vascular Plant Species Documented On Site
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Scientific Name	Common Name	Relative Frequency[a]	Rank[b]	Habitat	Observed On Site[c]
Sporobolus neglectus	NA	Frequent		Dry openings and road berms	1
Stachys tenuifolia	Hedge nettle	Occasional		Fields	3
Stellaria longifolia	long-leaved stitchwort	Occasional		Moist, grassy fields	1
Symphoricarpos orbiculatus	coralberry	Occasional		Thickets, woods borders, and roadsides	1
Teucrium canadense	American germander	Occasional		Moist openings	1,3
Thelypteris palustris	marsh fern	Occasional, frequent		Moist depressions and roadsides	1
Toxicodendron radicans	Poison ivy	Frequent		Upland and facultative woods, old fields	2
Tradescantia ohioensis	Ohio spiderwort	Occasional		Old fields	3
Triadenum virgnianum	pink St. John's-wort	Rare		Moist swale in northern bunker area	1
Tridens flavus	purpletop	Occasional		Moist fields and roadsides	1
Trifolium hybridum	Alsike clover	Occasional		Fields	3
Triosteum perfoliatum	Wild coffee	Rare		Fields	3
Tussilago farfara	coltsfoot	NA		NA	3
Typha angustifolia	Narrow-leaved cattail	frequent		Ditches	2
Typha latifolia	broad-leaved cattail	Frequent		Moist openings, ponds, and ditches	1,3
Ulmus americana	American elm	Occasional		Moist woods and stream banks	1,2
Ulmus rubra	slippery elm	Occasional		Moist woods and stream banks	1
Urtica dioica var. procera	American stinging nettle	Occasional, common		Moist fields and openings	1
Urtica dioicia	stinging nettle	NA		NA	3
Verbascum thapsus	woolly mullein	NA		NA	3
Verbena hastata	purple vervain	Frequent		Moist fields, stream banks, and ditches	1,3
Verbena simplex	prairie vervain	Rare		A single stand in dry opening along angling road	1
Verbena stricta	Vervain	Occasional		Fields	3
Verbena urticifolia	white vervain	Occasional, frequent		Moist woods borders and roadsides	1,3
Verbesina alternifolia	wingstem	Frequent, occasional		Moist woods borders, stream banks, and ditches	1,2
Vernonia gigantea	tall ironweed	Occasional, frequent		Dry to moist fields	1
Viburnum lentago	nannyberry	Frequent		Moist thickets and borders	1
Vicia americana	American vetch	Rare		Old field	3
Viola canadensis	Canada violet	NA		NA	2
Viola cucullata	violet	NA		NA	2
Viola lanceolata	lance-leaved violet	Frequent	P	Ditches and moist openings	1
Viola sagittata	arrow-leaved violet	Frequent		Grassy fields and dry banks	1
Viola sororia	common blue violet	Common, occasional		Grassy fields, roadsides, and about buildings	1
Vitis aestivalis	summer grape	NA		NA	3
Vitis riparia	riverbank grape	Frequent		Woods borders, thickets, and stream banks	1,2
Vitis vulpina	fox grape	Occasional		Woods borders and thickets	1
Wolffia columbiana	Columbian water meal	NA		NA	2
Xanthium strumarium	Cockle bur	NA		NA	3
Zanichellia palustris	horned pondweed	Rare		Artificial pond west of Snake Road	1
Zizia aurea	Golden alexanders	Rare		Old fields	3

[a] Common = Species which occur in large numbers throughout.
Frequent = Species regularly encountered, but occurring in lesser numbers than common ones.
Occasional = Species found in several places, but never present in large numbers.
Rare = Species found in few places and in low numbers.

[b] T = Ohio Threatened Species. P = Ohio Potentially Threatened Species. E = Ohio Endangered Species.

[c] 1 = Biological Inventory of Plum Brook Station (Ohio Department of Natural Resources, 1994).
2 =Observed at Ash Pit 1 during site reconnaissance October, 2008 and/or June, 2009.
3 =Observed at Ash Pit 3 during site reconnaissance October, 2008 and/or June, 2009.
4 =Observed during a site reconnaissance at another Plum Brook site.

NA – Not available

* Non-native species.

APPENDIX B

ECOLOGICAL SCREENING VALUES

Table B-1

Ecological Screening Values for Soil
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)	Reference
Inorganic Analytes								
Aluminum	7429-90-5	pH Dependent	NSV	NSV	NSV	50	pH Dependent	a
Antimony	7440-36-0	0.27	5	0.142	NSV	5	0.27	a
Arsenic	7440-38-2	18	9.9	5.7	60	10	18	a
Barium	7440-39-3	330	283	1.04	NSV	500	330	a
Beryllium	7440-41-7	21	10	1.06	NSV	10	21	a
Cadmium	7440-43-9	0.36	4	0.00222	20	4	0.36	a
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV	Nutrient	
Chromium	7440-47-3	26	0.4	0.4	0.4	1	26	a
Chromium, hexavalent	18540-29-9	81	NSV	NSV	NSV	NSV	81	a
Cobalt	7440-48-4	13	20	0.14	NSV	20	13	a
Copper	7440-50-8	28	60	5.4	50	100	28	a
Iron	7439-89-6	pH Dependent	NSV	NSV	NSV	NSV	pH Dependent	a
Lead	7439-92-1	11	40.5	0.0537	500	50	11	a
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV	Nutrient	
Manganese	7439-96-5	220	NSV	NSV	NSV	500	220	a
Mercury	7439-97-6	NSV	0.00051	0.1	0.1	0.3	0.00051	b
Nickel	7440-02-0	38	30	13.6	200	30	38	a
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV	Nutrient	
Selenium	7782-49-2	0.52	0.21	0.0276	70	1	0.52	a
Silver	7440-22-4	4.2	2	4.04	NSV	2	4.2	a
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV	Nutrient	
Thallium	7440-28-0	NSV	1	0.0569	NSV	1	1	b
Vanadium	7440-62-2	7.8	2	1.59	NSV	2	7.8	a
Zinc	7440-66-6	46	8.5	6.62	200	50	46	a
Cyanide								
Cyanide, Total	57-12-5	NSV	NSV	1.33	NSV	NSV	1.33	c
Polychlorinated Biphenyls								
Aroclor 1016	12674-11-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Aroclor 1221	11104-28-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Aroclor 1260	11096-82-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371	b
Organochlorine Pesticides								
4,4'-DDE	72-55-9	0.021 [g]	NSV	0.596	NSV	NSV	0.021	a
4,4'-DDT	50-29-3	0.021 [g]	NSV	0.0035	NSV	NSV	0.021	a
Methoxychlor	72-43-5	NSV	NSV	0.0199	NSV	NSV	0.0199	c
Nitroaromatics								
Amino-2,6-dinitrotoluene, 4-	19406-51-0	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328	c
Amino-4,6-dinitrotoluene, 2-	35572-78-2	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328	c
Dinitrotoluene, 2,4-	121-14-2	NSV	NSV	1.28	NSV	NSV	1.28	c
Dinitrotoluene, 2,6-	606-20-2	NSV	NSV	0.0328	NSV	NSV	0.0328	c
Semivolatile Organic Compounds								
Acenaphthylene	208-96-8	29	NSV	682	NSV	NSV	29	a
Anthracene	120-12-7	29	NSV	1480	NSV	NSV	29	a
Benzo(a)anthracene	56-55-3	1.1	NSV	5.21	NSV	NSV	1.1	a
Benzo(a)pyrene	50-32-8	1.1	NSV	1.52	NSV	NSV	1.1	a
Benzo(b)fluoranthene	205-99-2	1.1	NSV	59.8	NSV	NSV	1.1	a
Benzo(ghi)perylene	191-24-2	1.1	NSV	119	NSV	NSV	1.1	a
Benzo(k)fluoranthene	207-08-9	1.1	NSV	148	NSV	NSV	1.1	a
Benzoic acid	65-85-0	NSV	NSV	NSV	NSV	NSV	NSV	
bis(2-Ethylhexyl)phthalate	117-81-7	NSV	NSV	0.925	NSV	NSV	0.925	c
Chrysene	218-01-9	1.1	NSV	4.73	NSV	NSV	1.1	a

Table B-1

Ecological Screening Values for Soil
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)	Reference
Dibenzofuran	132-64-9	NSV	NSV	NSV	NSV	NSV	NSV	
Di-n-butyl phthalate	84-74-2	NSV	200	0.15	NSV	200	200	b
Fluoranthene	206-44-0	1.1	NSV	122	NSV	NSV	1.1	a
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	NSV	109	NSV	NSV	1.1	a
Methylnaphthalene, 2-	91-57-6	29	NSV	3.24	NSV	NSV	3.24	c
Naphthalene	91-20-3	29	NSV	0.0994	NSV	NSV	29	a
Phenanthrene	85-01-8	29	NSV	45.7	NSV	NSV	29	a
Pyrene	129-00-0	1.1	NSV	78.5	NSV	NSV	1.1	a
Volatile Organic Compounds								
Acetone	67-64-1	NSV	NSV	2.5	NSV	NSV	2.5	c
Benzene	71-43-2	NSV	NSV	0.255	NSV	NSV	0.255	c
Bromomethane	74-83-9	NSV	NSV	0.235	NSV	NSV	0.235	c
Butanone, 2-	78-93-3	NSV	NSV	89.6	NSV	NSV	89.6	c
Carbon disulfide	75-15-0	NSV	NSV	0.0941	NSV	NSV	0.0941	c
Dichloroethane, 1,1-	75-34-3	NSV	NSV	20.1	NSV	NSV	20.1	c
Dichloroethene, 1,1-	75-35-4	NSV	NSV	8.28	NSV	NSV	8.28	c
Dichloroethene, cis-1,2-	156-59-2	NSV	NSV	0.784 [h]	NSV	NSV	0.784	c
Methylene chloride	75-09-2	NSV	NSV	4.05	NSV	NSV	4.05	c
Toluene	108-88-3	NSV	200	5.45	NSV	200	200	b
Trichloroethane, 1,1,1-	79-00-5	NSV	NSV	29.8	NSV	NSV	29.8	c
Trichloroethene	79-01-6	NSV	NSV	12.4	NSV	NSV	12.4	c
Trimethylbenzene, 1,2,4-	95-63-6	NSV	NSV	NSV	NSV	NSV	NSV	
Xylene, Total	1330-20-7	NSV	NSV	10	NSV	NSV	10	c

EPA = U.S. Environmental Protection Agency
ESV = Ecological screening value
NSV = No screening value available
mg/kg = milligrams per kilogram

Priority for Selection of ESVs:
1) EPA Eco-SSL
2) PRG for Eco Endpoints, (Efroymson, et.al, 1997a)
3) EPA Region 5 Ecological Screening Levels
4) Efroymson, 1997b
5) Efroymson, 1997c

[a] EPA, 2008, Ecological Soil Screening Level (SSL) guidance. On-line at: http://www.epa.gov/ecotox/ecossl/index.html
[b] Efroymson, 1997a, *Preliminary Remediation Goals for Ecological Endpoints* . www.esd.ornl.gov/programs/ecorisk/documents/tm162r2.pdf .
[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level (ESL)* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.
[d] Efroymson, R.A., M.E. Will, G.W. Suter, 1997b, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision, ES/ER/TM-126/R2 (microbial screening values are not included). http://www.esd.ornl.gov/programs/ecorisk/documents/tm126r21.pdf.
[e] Efroymson, R.A., M.E. Will, G.W. Suter, 1997c, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision, ES/ER/TM-85/R3. http://www.esd.ornl.gov/programs/ecorisk/documents/tm85r3.pdf
[f] Based on the screening value for total PCBs.
[g] Based on the screening value for DDT and metabolites.
[h] Based on the screening value for dichloroethylene [trans-1,2].

Table B-2

Ecological Screening Values for Surface Water
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	Ohio Water Quality Criteria [a] µg/L		Eco PRG [b] µg/L	EPA Region 5 ESV [c] µg/L	Selected Surface Water ESV [d] µg/L
Inorganic Analytes						
Aluminum	7429-90-5	NSV		87	NSV	87
Arsenic	7440-38-2	150	f	3.1	148	3.1
Barium	7440-39-3	220		4	220	4
Beryllium	7440-41-7	100	e	0.66	3.6	0.66
Calcium	7440-70-2	NSV		NSV	NSV	Nutrient
Chromium	7440-47-3	270	e,f	210	42	42
Cobalt	7440-48-4	24		23	24	23
Copper	7440-50-8	30	e,f	12	1.58	1.58
Iron	7439-89-6	NSV		1000	NSV	1000
Lead	7439-92-1	37	e,f	3.2	1.17	1.17
Magnesium	7439-95-4	NSV		NSV	NSV	Nutrient
Manganese	7439-96-5	NSV		120	NSV	120
Nickel	7440-02-0	170	e,f	160	28.9	28.9
Potassium	7440-09-7	NSV		NSV	NSV	Nutrient
Selenium	7782-49-2	5	f	0.39	5	0.39
Sodium	7440-23-5	NSV		NSV	NSV	Nutrient
Vanadium	7440-62-2	44		20	12	12
Zinc	7440-66-6	390	e,f	110	65.7	65.7
Semivolatile Organic Compounds						
bis(2-Ethylhexyl)phthalate	117-81-7	8.4		0.12	0.3	0.12
Volatile Organic Compounds						
Dichloroethane, 1,1-	75-34-3	410		47	47	47
Dichloroethene, cis-1,2-	156-59-2	970		590	970	590
Trichloroethane, 1,1,1-	71-55-6	76		11	76	11

COPEC = Chemical of potential ecological concern
ESV = Ecological screening value
µg/L = microgram per liter
NSV = No screening value available

[a] Ohio Environmental Protection Agency (OEPA, 2002), Division of Surface Water, Water Quality Standards, Chapter 3745-1 of the Ohio Administrative Code, Dec 30. http://www.epa.state.oh.us/dsw/rules/3745-1.html. Value is the Outside Mixing Zone Average value.

[b] *Preliminary Remediation Goals (PRG) for Ecological Endpoints* , (Efroymson et. al., 1997).

[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.

[d] Surface water ESVs are selected by choosing the minimum screening value based on the three sources provided.

[e] Hardness dependent value (see Table 7-9 in the OAC Chapters 3741-1 and 3791-2). Screening values using a hardness of 400 mg/L $CaCO_3$ were selected, based on a site-specific water hardness of 464 mg/L $CaCO_3$.

[f] Total Recoverable (TR) value is used, per Ohio Administrative Code Chapter 3745-2-04.

Table B-3

Ecological Screening Values for Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	TEC [a] mg/kg	EPA Region 5 ESV [b] mg/kg	Ecological PRG [c] mg/kg	Ontario Sediment Quality Guidelines [d] mg/kg	Selected ESV [e] mg/kg
Inorganic Analytes						
Aluminum	7429-90-5	NSV	NSV	NSV	NSV	NSV
Antimony	7440-36-0	NSV	NSV	NSV	NSV	NSV
Arsenic	7440-38-2	9.79	9.79	42	6	9.79
Barium	7440-39-3	NSV	NSV	NSV	NSV	NSV
Beryllium	7440-41-7	NSV	NSV	NSV	NSV	NSV
Cadmium	7440-43-9	0.99	0.99	4.2	0.6	0.99
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV
Chromium	7440-47-3	43.4	43.4	159	26	43.4
Cobalt	7440-48-4	NSV	50	NSV	50	50
Copper	7440-50-8	31.6	31.6	77.7	16	31.6
Iron	7439-89-6	NSV	NSV	NSV	NSV	NSV
Lead	7439-92-1	35.8	35.8	110	31	35.8
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV
Manganese	7439-96-5	NSV	NSV	NSV	460	460
Mercury	7439-97-6	0.18	0.174	0.7	0.2	0.18
Nickel	7440-02-0	22.7	22.7	38.5	16	22.7
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV
Selenium	7782-49-2	NSV	NSV	NSV	NSV	NSV
Silver	7440-22-4	NSV	0.5	1.8	0.5	0.5
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV
Thallium	7440-28-0	NSV	NSV	NSV	NSV	NSV
Vanadium	7440-62-2	NSV	NSV	NSV	NSV	NSV
Zinc	7440-66-6	121	121	270	120	121
Nitroaromatics						
2,4,6-Trinitrotoluene	118-96-7	NSV	NSV	NSV	NSV	NSV
Polychlorinated Biphenyls						
Aroclor 1254	11097-69-1	0.0598	0.0598	72	0.07	0.0598
Aroclor 1260	11096-82-5	0.0598	0.0598	63	0.07	0.0598
Semivolatile Organic Compounds						
Benzo(a)anthracene	56-55-3	0.108	0.108	0.69	0.32	0.108
Benzo(a)pyrene	50-32-8	0.15	0.15	0.394	0.37	0.15
Benzo(b)fluoranthene	205-99-2	NSV	10.4	NSV	NSV	10.4
Benzo(ghi)perylene	191-24-2	NSV	0.17	6.3	0.17	0.17
Benzo(k)fluoranthene	207-08-9	NSV	0.24	NSV	0.24	0.24

Table B-3

Ecological Screening Values for Sediment
Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	TEC [a] mg/kg	EPA Region 5 ESV [b] mg/kg	Ecological PRG [c] mg/kg	Ontario Sediment Quality Guidelines [d] mg/kg	Selected ESV [e] mg/kg
Chrysene	218-01-9	0.166	0.166	0.85	0.34	0.166
Dibenzofuran	132-64-9	NSV	0.449	0.42	NSV	0.449
Di-n-butyl phthalate	84-74-2	NSV	1.114	240	NSV	1.114
Fluoranthene	206-44-0	NSV	0.423	0.834	0.75	0.423
Indeno(1,2,3-cd)pyrene	193-39-5	NSV	0.2	0.837	0.2	0.2
Methylnaphthalene, 2-	91-57-6	NSV	0.0202	NSV	NSV	0.0202
Naphthalene	91-20-3	0.176	0.176	0.39	NSV	0.176
Phenanthrene	85-01-8	0.204	0.204	0.54	0.56	0.204
Pyrene	129-00-0	0.195	0.195	1.4	0.49	0.195
Volatiles Organic Compounds						
Acetone	67-64-1	NSV	0.0099	0.0091	NSV	0.0099
Carbon disulfide	75-15-0	NSV	0.0239	0.00086	NSV	0.0239
Methylene chloride	75-09-2	NSV	0.159	18	NSV	0.159

ESV = Ecological screening value
mg/kg = milligrams per kilogram
NSV = No screening value available

Priority for Selection of ESVs:

1. Threshold effect concentrations (MacDonald et al., 2000)
2. EPA Region 5 ESLs (EPA, 2003)
3. Sediment PRGs (Efroymson, 1997)
4. Sediment quality criteria (OME, 1993)

[a] Threshold Effect Concentrations (TECs), MacDonald, et al., 2000, *Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems,* Arch Environ Contam Toxicol 39:20-31.

[b] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level* , Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm.

[c] Efroymson,et. al., 1997, *Preliminary Remediation Goals for Ecological Endpoints* .

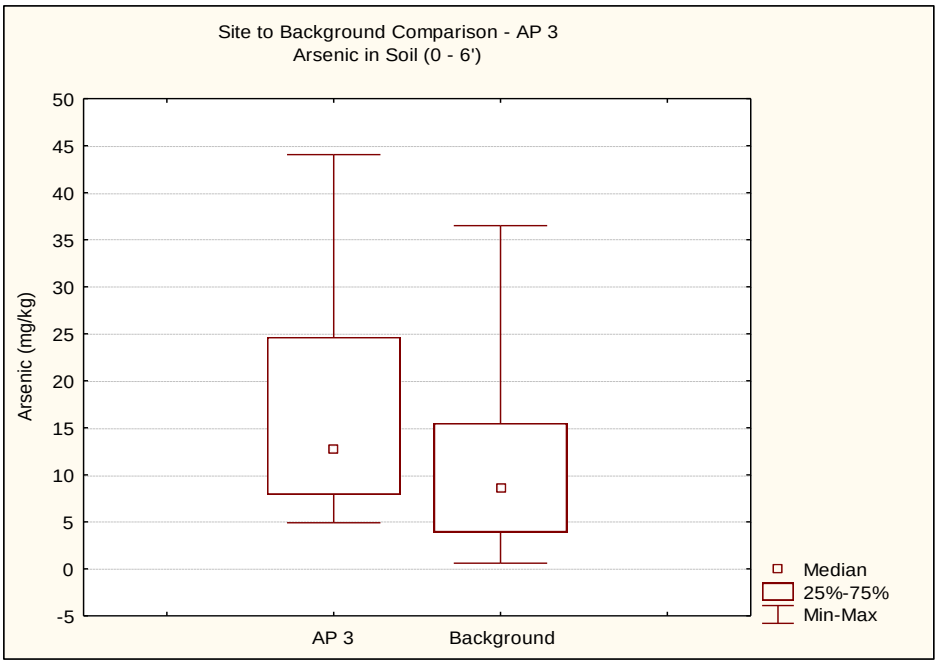
[d] Ontario Ministry of the Environment, 1993 (OME, 1993). Persaud, et al. *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario,* August.

APPENDIX C

WILCOXON RANK SUM TEST RESULTS AND BOX PLOTS FOR ASH PIT 3

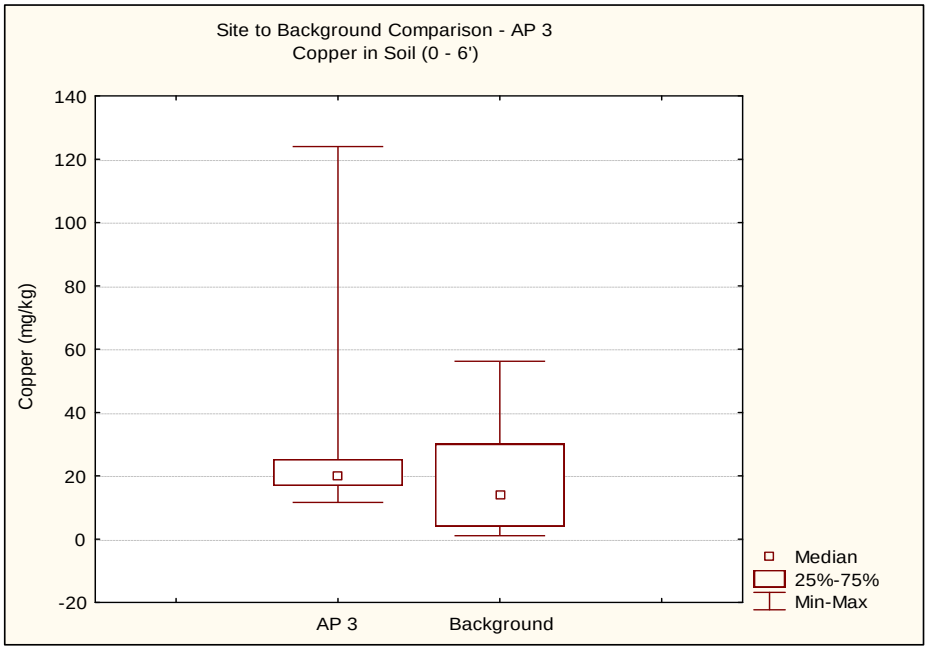
Appendix C

Wilcoxon Rank Sum Test Results and Box Plots for Soil Concentrations of Arsenic in Background Vs. Ash Pit 3 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Arsenic	408.0	495.0	144.0	1.65764	0.097	1.66	0.097	16	26	0.100

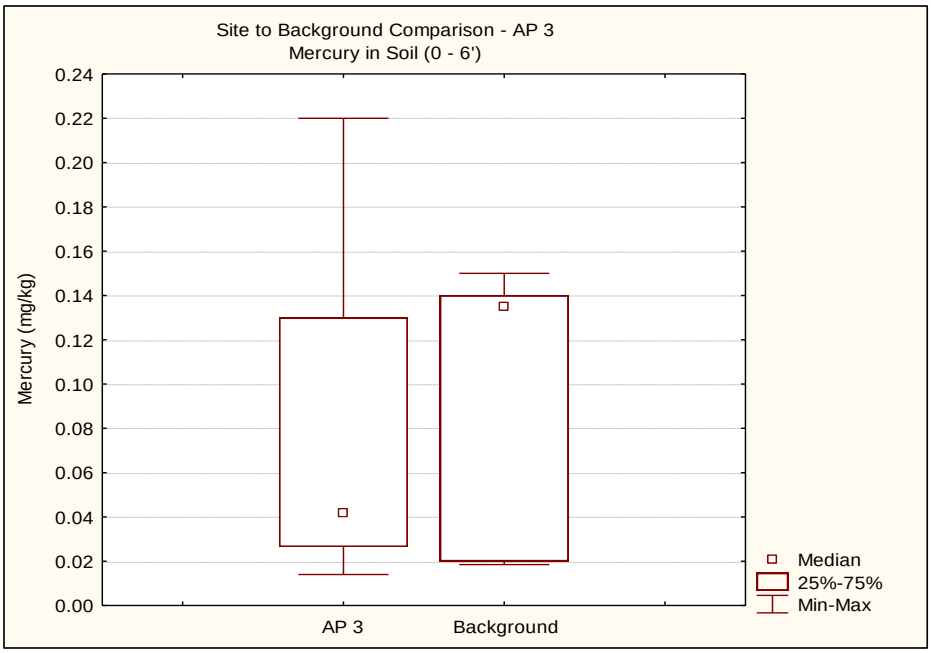
Wilcoxon Rank Sum Test Results and Box Plots for Soil Concentrations of Copper in Background Vs. Ash Pit 3 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Copper	418.0	485.0	134.0	1.91664	0.055284	1.91680	0.055264	16	26	0.056315

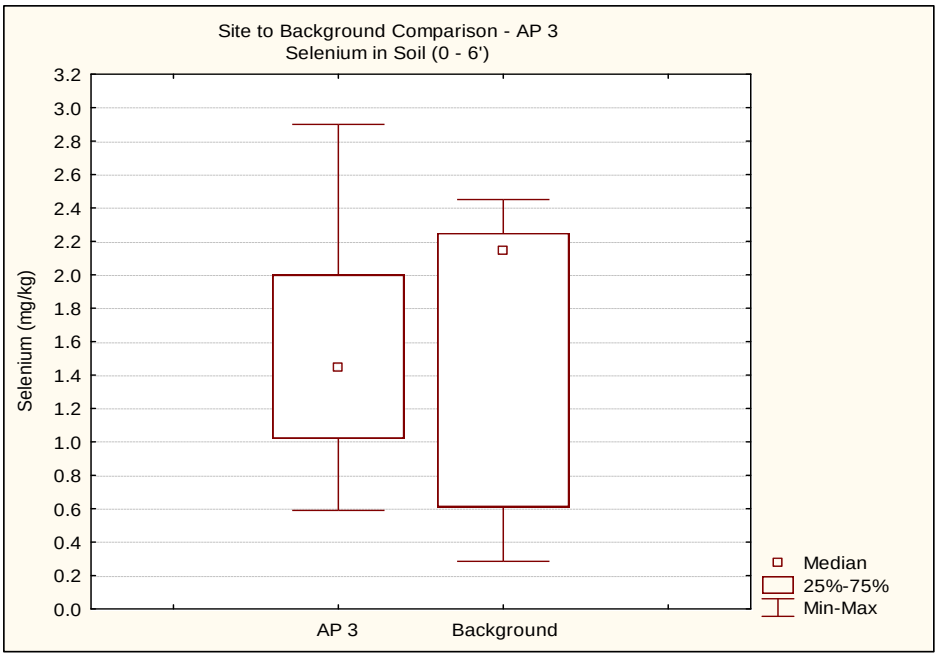
Appendix C

Wilcoxon Rank Sum Test Results and Box Plots for Soil/Sediment Concentrations of Mercury in Background Vs. Ash Pit 3 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Mercury	317.0	586.0	181.0	-0.69932	0.484	-0.70	0.483	16	26	0.497

Wilcoxon Rank Sum Test Results and Box Plots for Soil/Sediment Concentrations of Selenium in Background Vs. Ash Pit 3 Samples



	Rank Sum	Rank Sum	U	Z	p-level	Z	p-level	Valid N	Valid N	2*1sided
Selenium	320.0	541.0	184.0	-0.42762	0.669	-0.43	0.669	16	25	0.682

APPENDIX D

ASSESSMENT RECEPTOR PROFILES

Appendix D

Assessment Receptor Profiles

Eastern Cottontail (Sylvilagus floridanus). These medium-size grazing herbivores are found over most of the eastern half of the United States and southern Canada, and have been widely introduced into the western U.S. Environmental Protection Agency ([EPA], 1993). The eastern cottontail is unique to the genus because of the large variety of habitats that it occupies, including glades and woodlands, deserts, swamps, prairies, hardwood forests, rain forests, and boreal forests (EPA, 1993). Open grassy areas are generally are used for grazing at night, whereas dense, heavy cover typically is used for shelter during the day (EPA, 1993). During the summer seasons these rabbits consume herbaceous plants (e.g. grasses, clover, timothy, and alfalfa), whereas winter diet typically consists of woody vines, shrubs and trees (e.g.. birch, maple, and apple) (EPA, 1993). Home range is 3 to 20 acres, with larger ranges in the summer and smaller ranges in the winter (Burt and Grossenheider, 1980). Populations fluctuate from 1 to 4 cottontail per four acres to several per acre in winter conditions (Burt and Grossenheider, 1980). The eastern cottontail breeds from February through September and usually produces 3 to 4 litters per year of 1 to 9 young (usually 4 to 5); however, this rabbit's' death rate vies with its birth rate, and few rabbits live for more than one year (Whitaker, 1995). The average longevity is 1.25 years (EPA, 1993).

References:

Burt, W. H. and R. P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J. O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Deer Mouse (Peromyscus maniculatus). This medium-sized mouse is found in the eastern United States from the Hudson Bay to Pennsylvania, the southern Appalachians, central Arkansas, and central Texas. In the west it is found from Mexico to the south Yukon and north-west territories (Whitaker, 1995). Deer mice habitat includes nearly every dry land habitat within its range, including forest, grasslands, or a mixture of the two (Burt and Grossenheider, 1980). Nocturnal and active year-round, these mice construct nests in the ground, trees, stumps, and buildings (Burt and Grossenheider, 1980). Omnivorous, the deer mouse feeds on nuts and

seeds (e.g., jewel weed and black cherry pits), fruits, beetles, caterpillars, and other insects. Deer mice may cache their food during the fall and winter in the more northern parts of their range (EPA, 1993). Home range is 0.15 to 3 acres (Burt and Grossenheider, 1980; EPA, 1993). Density of populations is 4 to 12 mice per acre, and average life span is 2 years in the wild (Burt and Grossenheider, 1980). The breeding season is from February to November, depending on latitude. Three to five young are born in each of two to four litters per year (Burt and Grossenheider, 1980). They are gray- to red-brown with a white belly and a distinctly short-haired, bicolor tail (Whitaker, 1995). Weight range is 14.8 (EPA, 1993) to 33 grams (Whitaker, 1995).

References:

Burt, W. H. and R. P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J. O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Mallard Duck (Anas platyrhynchos). The mallard duck is widespread throughout most of the United States and is the most abundant of the United States ducks. It is large, migratory duck with an average body size of 58 centimeters from bill to tail tip. Wintering mallards prefer the natural bottom-land wetlands and rivers where water depths are 20 to 40 centimeters. The primary habitat requirement for nesting is thought to be dense grassy vegetation. Nests are generally located within a few kilometers of water (EPA, 1993).

In winter, mallards feed primarily on seeds, invertebrates, agricultural grains and, to a limited extent, leaves, stems, buds, rootlets, and tubers. In spring, females shift mostly to a diet of invertebrates to support molting and egg laying activities. Ducklings also feed mainly on invertebrates to help support their rapid growth rates. Mallards are serially monogamous and remate annually. Each pair of mallards establishes a territory and the drake defends it against other mallards. Average home range size varies, depending upon the type of habitat available. High rates of nest failure require the females to renest persistently, with average clutch size decreasing as the breeding season progresses. Annual adult mortality rates vary with year, depending on location, hunting pressure, age, and sex. Females suffer greater natural mortality rates than do males (EPA, 1993).

The typical home range of the mallard is from 540 to 620 hectares (ha) for adult female and male birds, respectively, for wetlands and river habitat in Minnesota (USEPA, 1993). For the current ERA, an average home range of 580 ha was used. The typical migration schedule is from mid-March through mid-May for the spring migration. The fall migration typically starts in mid-October, and peaks in November (USEPA, 1993).

References:

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Red-Tailed Hawk (Buteo jamacensis). This carnivorous hawk is one of the most common and widespread members of the genus *Buteo* in the continental United States and Canada (Brown and Amadon, 1968). Red-tailed hawks live in a variety of habitats, such as farmlands, woodlands, mountains, and deserts, as long as there is open country interdispersed with woods, bluffs, or streamside trees. They are primarily carnivorous, feeding on (greater than 85 percent) small rodents, as well as fish. Other prey items include amphibians, reptiles, crayfish, and other birds (Adamcik, et al., 1979; Ehrlich, et al., 1988). Home range has been reported as approximately 66.8 acres, with a population density of 0.16 pairs per acre (Janes, 1984), although EPA (1993) reports an average territory size of 842 hectares (2,080 acres). Breeding population density is one nest per 0.009 acre or one individual per 0.004 acre. Body weight for male red-tails is 1,028.6 to 1,142.9 grams, and for females 1,371.4 to 1,600 grams (Brown and Amadon, 1968), although EPA (1993) reports an average body weight of 957 grams. They typically mate for life or until one of the pair dies, with pairs clinging to territories year after year (Austing, 1964).

References:

Adamcik, R. S., A. W. Todd, and L. B. Keith, 1979, "Demographic and Dietary Responses of Red-Tailed Hawks During a Snowshoe Hare Fluctuation," ***Canadian Field Naturalist***, Vol. 93, pp. 16-27.

Austing, G. R., 1964, ***The World of the Red-Tailed Hawk***, J. B. Lippincott Co., Philadelphia.

Brown, L. and D. Amadon, 1968, ***Eagles, Hawks, and Falcons of the World***, Vol. 1, McGraw-Hill Book Company, New York.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye, 1988, ***The Birder's Handbook: A field guide to the Natural History of North American Birds***, Simon and Shuster, Inc., New York.

Janes, S. W., 1984, "Influences of Territory Composition and Interspecific Competition on Red-Tailed Hawk Reproductive Success," ***Ecology***, 65:862-870.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Raccoon (Procyon lotor). Raccoons are native only in the Americas. Their range extends from the southern edge of the southern provinces of Canada and most of the United States, except for portions of the Rocky Mountain states, central Nevada, and Utah (Whitaker, 1995). The raccoon weighs from 3 to 15 kilograms (Merritt, 1987; EPA, 1993) and has a head and body length of 46 to 71 centimeters and a tail length of 20 to 30 centimeters (Burt and Grossenheider, 1980). The raccoon is nocturnal and solitary, except when breeding or caring for its young. During particularly cold spells, the raccoon may sleep for several days at a time but does not hibernate (Whitaker, 1995). The raccoon is found along lakes near wooded areas or rock cliffs (Burt and Grossenheider, 1980), but prefers wooded streams (Whitaker, 1995). The raccoon is highly omnivorous and is an opportunistic feeder, consuming virtually any animal or plant matter that is available (Merritt, 1987; EPA, 1993). Animal matter predominates the diet during the spring and early summer; plant matter predominates during late summer, autumn, and winter (Merritt, 1987; EPA, 1993). The home range of the raccoon extends up to 3.2 kilometers across, but usually it is less than 1.6 kilometers. Population densities range from one per acre (highest) to one per 15 acres (considered high) (Burt and Grossenheider, 1980). Captive raccoons live for approximately 14 years (Burt and Grossenheider, 1980). Average body weight is 5.1 kilograms (EPA, 1993).

References:

Burt, W. H., and R. P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

Merritt, J. F., 1987, ***Guide to the Mammals of Pennsylvania***, University of Pittsburgh Press, Pennsylvania.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook, Volume I of II***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J. O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

Short-tailed Shrew (Blarina brevicauda). This shrew is the largest found in North America. It is solid grey above and below, with a short tail, and weighs between 15 and 29 grams (Whitaker, 1995). Total length of this shrew is 76 to 102 millimeters (Burt and Grossenheider, 1980). The range of this shrew extends from southeastern Canada and the north-

eastern U.S. to Nebraska, Missouri, Kentucky, and in the mountains to Alabama (Whitaker, 1995). Preferable habitat for the shrew includes forests, grasslands, marshes, and brushy areas. It will make a nest of dry leaves, grass, and hair beneath logs, stumps, rocks, or debris (Burt and Grossenheider, 1980). This underground tunneler may burrow as deep as 6 feet, and has a voracious appetite, eating one half of its own body weight per day of earthworms, other terrestrial vertebrates, and sometimes young mice (Whitaker, 1995). Mean population densities range from 5.7 in the winter, to 28 per acre in the summer (EPA, 1993). Their home range varies from 0.5 to 1 acre (Burt and Grossenheider, 1980). Longevity is typically around 20 months (EPA, 1993), with five to eight young born to each of two to three litters (Burt and Grossenheider, 1980).

References:

Burt, W. H. and R. P. Grossenheider, 1980, "A Field Guide to Mammals," ***Peterson Field Guide Series***, Hougton Mifflin Co., Boston.

U.S. Environmental Protection Agency (EPA), 1993, ***Wildlife Exposure Factors Handbook***, Office of Health and Environmental Assessment, Office of Research and Development, EPA/600/R93/187a.

Whitaker Jr., J. O., 1995, ***The Audubon Society Field Guide to North American Mammals***, Alfred A. Knopf, Inc., New York.

White-tailed Deer (Odocoileus virginianus). The white-tailed deer is a member of the Family Cervidae. They are large, even-toed, hoofed mammals with long legs. Their coat is predominantly light brown or chestnut colored, with the underparts being white. Deer are primarily herbivorous grazers and browsers, constantly moving from one food source to the next. The deer's diet changes seasonally. When available, farm crops such as winter wheat, corn, alfalfa, soy beans, and hay are important components of the species diet. Other top food items include wild crab apples, sumac, grasses, green briar, clover, jewelweed, acorns, and dogwood. In regions where the climate varies from season to season, deer may make annual migrations of 10 to 20 miles in the search for food. However, in Ohio, deer typically have rather small home ranges (2 to 3 square miles) and are reluctant to leave this range. The average weight for the species is 88 kilograms for males and 61 kilograms for females. Breeding season ranges from November through February, with the young offspring born in May and early June. Virtually all yearling and adult does conceive each year, and in Ohio usually carry twins. Triplets and quadruplets have also been recorded Gottschang (1981).

References:

Gottschang, J. L., 1981, ***A Guide to the Mammals of Ohio***, The Ohio State University Press, pp. 143-149.

Marsh Wren (Cistothorus palustris). The marsh wren is a small bird (4 to 4.5 inches in length) which inhabits freshwater cattail marshes and salt marshes. Nesting pairs are not likely to occupy other habitats and the species avoids the wet meadow and sedge meadow habitats preferred by sedge wrens. Marsh wrens breed throughout most of the northern half of the United States and in coastal areas as far south as Florida. The species eats mostly insects, and occasionally snails and other invertebrates. The average body weight is 0.01 kilograms, and the average home range for the species is 0.054 hectares. Because the species is polygamous, there may be more females than males inhabiting a breeding marsh. Densities as high as 120 birds per hectare have been recorded (EPA, 1993). Marsh wrens' nests are globular structures placed at heights of 2 to 5 feet in dense vegetation. The males commonly build dummy nests in addition to the one where the eggs will be laid (Peterjohn and Rice, 1991).

References:

U.S. Environmental Protection Agency (EPA), Office of Research and Development, 1993, ***Wildlife Exposure Factors Handbook***, EPA/600/R-93/187a.

Peterjohn, B. G., and Rice, D. L., 1991, ***The Ohio Breeding Bird Atlas***, The Ohio Department of Natural Resources.

Muskrat (Ondata zibethicus). The muskrat is a member of the Family Muridaee. Muskrats are the most aquatic of this family of rodents, and spend much of their lives in or near bogs, marshes, lakes or streams. Their diet consists primarily of aquatic vegetation (in particular the roots or basal portions of aquatic plants), although they can be omnivorous if other food sources are more common. Marsh grasses, sedges, and cattails are important muskrat food items. They are indigenous and common throughout most of the United States. Muskrats have relatively small home ranges that vary in configuration based on the physical attributes of their aquatic habitat. The average weight for the species is approximately 1.3 kilograms for males and 1.2 kilograms for females during the winter, and 0.9 kg for males and 0.8 kg for females during the spring. Muskrats typically breed during the first spring after birth, and typically produce 1-12 pups, with southern populations producing more litters, but fewer pups per litter compared with northern populations (EPA, 1993).

References:

U.S. Environmental Protection Agency (EPA), Office of Research and Development, 1993, ***Wildlife Exposure Factors Handbook***, EPA/600/R-93/187a.

APPENDIX E

FOOD CHAIN MODEL EXPOSURE DOSES AND HAZARD QUOTIENTS

Table E-1
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Deer Mouse
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV_{NOAEL}	HQ_{NOAEL}	TRV_{LOAEL}	HQ_{LOAEL}
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	2.81E-01	0.00E+00	4.21E-02	0.00E+00	0.00E+00	3.25E-01	1.00E+00	3.25E-01	1.00E+01	3.25E-02
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E+01	0.00E+00	1.51E+01	0.00E+00
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							2.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-02	8.80E+01	3.29E-04	2.84E+02	1.02E-04
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	1.02E-02	0.00E+00	0.00E+00	5.95E-02	0.00E+00	6.83E-04	0.00E+00	0.00E+00	7.04E-02	7.40E-03	9.51E+00	7.40E-02	9.51E-01
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	2.49E-04	0.00E+00	0.00E+00	4.85E-04	0.00E+00	2.84E-03	0.00E+00	0.00E+00	3.57E-03	2.00E-01	1.79E-02	1.50E+00	2.38E-03
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E+00	0.00E+00	3.75E+01	0.00E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0.61	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0.39	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.000056	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0028	kg/d
Body weight =	0.0148	kg
Home range =	0.153	acres
Water intake rate =	0.0022	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-2
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Short-Tailed Shrew
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Total Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	2.63E-01	mg/kg	1.00E+00			1.09E+01		1.14E+00	5.76E-01	5.76E-01	0.00E+00	0.00E+00	4.01E-03	0.00E+00	0.00E+00	4.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-01	1.00E+00	4.24E-01	1.00E+01	4.24E-02
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E+01	0.00E+00	1.51E+01	0.00E+00
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-02	8.80E+01	3.40E-04	2.84E+02	1.05E-04
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	1.47E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	2.24E-02	0.00E+00	0.00E+00	6.47E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.71E-02	7.40E-03	1.18E+01	7.40E-02	1.18E+00
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.30E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	9.61E-04	0.00E+00	0.00E+00	9.24E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-03	2.00E-01	9.42E-03	1.50E+00	1.26E-03
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E+00	0.00E+00	3.75E+01	0.00E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.0002288	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0022	kg/d
Body weight =	0.015	kg
Home range =	0.96	acres
Water intake rate =	0.0023	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-3
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Cottontail Rabbit
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	5.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.08E-03	0.00E+00	0.00E+00	8.61E-03	1.00E+00	8.61E-03	1.00E+01	8.61E-04
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E+01	0.00E+00	1.51E+01	0.00E+00
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							4.95E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.95E-03	8.80E+01	5.62E-05	2.84E+02	1.74E-05
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	3.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	0.00E+00	0.00E+00	3.88E-03	7.40E-03	5.25E-01	7.40E-02	5.25E-02
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	9.18E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E-04	0.00E+00	0.00E+00	6.37E-04	2.00E-01	3.18E-03	1.50E+00	4.24E-04
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E+00	0.00E+00	3.75E+01	0.00E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	1	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.006048	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.096	kg/d
Body weight =	1.132	kg
Home range =	7.66	acres
Water intake rate =	0.11	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.26109661	unitless
Exposure Frequency (EF) =	1	unitless

Table E-4
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Marsh Wren
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	2.19E-03	0.00E+00	0.00E+00	1.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E+00	1.45E+00	7.64E-01	2.00E+01	5.54E-02
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+01	0.00E+00	6.17E+01	0.00E+00
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							5.27E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.27E-02	9.77E+02	5.39E-05	9.77E+03	5.39E-06
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	1.56E-02	0.00E+00	0.00E+00	2.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-01	3.50E-01	7.13E-01	3.50E+00	7.13E-02
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	3.82E-04	0.00E+00	0.00E+00	1.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-03	7.00E-01	3.27E-03	1.78E+01	1.29E-04
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	3.50E+00	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	5.00E+00	0.00E+00
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E+01	0.00E+00	3.95E+02	0.00E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	1	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.000058	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.0029	kg/d
Body weight =	0.01	kg
Home range =	0.13	acres
Water intake rate =	0.0027	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

Table E-5
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the White-Tailed Deer
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Total Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	2.63E-01	mg/kg	1.00E+00			1.09E+01		1.14E+00	5.76E-01	5.76E-01	0.00E+00	0.00E+00	2.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-05	0.00E+00	0.00E+00	1.56E-05	1.00E+00	1.56E-05	1.00E+01	1.56E-06
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E+01	0.00E+00	1.51E+01	0.00E+00
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							2.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-05	8.80E+01	2.27E-07	2.84E+02	7.04E-08
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	1.47E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	1.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-07	0.00E+00	0.00E+00	1.67E-06	7.40E-03	2.26E-04	7.40E-02	2.26E-05
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.30E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	6.45E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-06	0.00E+00	0.00E+00	1.27E-06	2.00E-01	6.36E-06	1.50E+00	8.48E-07
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E+00	0.00E+00	3.75E+01	0.00E+00

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi \, x Cij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	1	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.04	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	2	kg/d
Body weight =	61	kg
Home range =	1280	acres
Water intake rate =	4	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.0015625	unitless
Exposure Frequency (EF) =	1	unitless

Table E-6
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Raccoon
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	4.69E-06	0.00E+00	0.00E+00	3.03E-04	0.00E+00	2.03E-05	2.38E-06	0.00E+00	3.30E-04	1.00E+00	3.30E-04	1.00E+01	3.30E-05
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	1.57E-03	0.00E+00	0.00E+00	9.11E-04	0.00E+00	7.29E-04	0.00E+00	0.00E+00	0.00E+00	3.21E-03	1.17E+01	2.74E-04	1.51E+01	2.12E-04
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							8.54E-05	0.00E+00	0.00E+00	2.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-04	8.80E+01	3.87E-06	2.84E+02	1.20E-06
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	3.35E-05	0.00E+00	0.00E+00	6.41E-05	0.00E+00	3.29E-07	4.37E-06	0.00E+00	1.02E-04	7.40E-03	1.38E-02	7.40E-02	1.38E-03
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	8.19E-07	0.00E+00	0.00E+00	5.23E-07	0.00E+00	1.37E-06	5.52E-14	0.00E+00	2.71E-06	2.00E-01	1.36E-05	1.50E+00	1.81E-06
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	1.78E-06	0.00E+00	0.00E+00	1.15E-05	0.00E+00	1.17E-06	0.00E+00	0.00E+00	0.00E+00	1.45E-05	1.00E+00	1.45E-05	1.00E+01	1.45E-06
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	1.97E-06	0.00E+00	0.00E+00	1.40E-05	0.00E+00	1.17E-06	0.00E+00	0.00E+00	0.00E+00	1.71E-05	1.00E+00	1.71E-05	1.00E+01	1.71E-06
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	2.56E-06	0.00E+00	0.00E+00	1.71E-05	0.00E+00	8.25E-06	0.00E+00	0.00E+00	0.00E+00	2.79E-05	7.50E+00	3.72E-06	3.75E+01	7.44E-07

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0.21	unitless
Aquatic plant diet fraction =	0.21	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0.02	unitless
Aq. Invert diet fraction =	0.21	unitless
Terr. Invert diet fraction =	0.3	unitless
Mammal diet fraction =	0.05	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0.01222	kg/d
Sediment ingestion rate =	0.01222	kg/d
Food ingestion rate =	0.26	kg/d
Body weight =	5.1	kg
Home range =	385	acres
Water intake rate =	0.43	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.00519481	unitless
Exposure Frequency (EF) =	1	unitless

Table E-7
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Red-Tailed Hawk
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV_{NOAEL}	HQ_{NOAEL}	TRV_{LOAEL}	HQ_{LOAEL}
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	4.32E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.81E-06	2.47E-06	1.07E-05	1.45E+00	7.39E-06	**NA**	**NA**
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+01	0.00E+00	**NA**	**NA**
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							1.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-05	9.77E+02	1.14E-08	**NA**	**NA**
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	3.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-05	4.54E-06	2.20E-05	3.50E-01	6.28E-05	**3.50E+00**	**6.28E-06**
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	7.54E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-13	5.73E-14	7.54E-08	7.00E-01	1.08E-07	**NA**	**NA**
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	**3.50E+00**	**0.00E+00**
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	**5.00E+00**	**0.00E+00**
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E+01	0.00E+00	**NA**	**NA**

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	0	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0.76	unitless
Bird diet fraction =	0.24	unitless
Soil ingestion rate =	0.00114	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.057	kg/d
Body weight =	0.957	kg
Home range =	2080	acres
Water intake rate =	0.057	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	0.0009615	unitless
Exposure Frequency (EF) =	1	unitless

Table E-8
Chemicals of Potential Concern
Exposure Doses and Hazard Quotients for the Muskrat
Ash Pit 3
Plum Brook Ordnance Works
Sandusky, Ohio

Chemical	Surface Water Exposure Point Concentration	Units	Sediment Exposure Point Concentration	Units	Surface Soil Exposure Point Concentration	Units	Soil BAF	Fish BAF	Aq. Invert. BAF	Terr. Invert. BAF	Aq. Plant BAF	Terr. Plant BAF	Mammal BAF	Bird BAF	EED Surface Water	EED Sediment	EED Soil	EED Fish	EED Aq. Invert.	EED Terr. Invert.	EED Aq. Plants	EED Terr. Plants	EED Mammals	EED Birds	Total EED	TRV NOAEL	HQ NOAEL	TRV LOAEL	HQ LOAEL
							----------Unitless----------								mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d	mg/kg-d
Metals																													
Cadmium	0.00E+00	mg/L	0.00E+00	mg/kg	3.77E-01	mg/kg	1.00E+00			1.01E+01		9.68E-01	4.76E-01	4.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	1.00E+01	0.00E+00
Copper	0.00E+00	mg/L	1.26E+02	mg/kg	0.00E+00	mg/kg	1.00E+00		1.30E-01		1.04E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	1.17E+01	3.36E-01	1.51E+01	2.60E-01
Manganese	1.95E-01	mg/L	0.00E+00	mg/kg	0.00E+00	mg/kg	1.00E+00	2.47E+02							1.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-02	8.80E+01	2.08E-04	2.84E+02	6.43E-05
Thallium	0.00E+00	mg/L	0.00E+00	mg/kg	2.69E+00	mg/kg	1.00E+00			3.00E-01		2.20E-03	1.23E-01	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.40E-03	0.00E+00	7.40E-02	0.00E+00
Explosives																													
2,6-Dinitrotoluene	0.00E+00	mg/L	0.00E+00	mg/kg	6.58E-02	mg/kg	1.00E+00			1.00E-01		3.74E-01	6.34E-08	6.34E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	1.50E+00	0.00E+00
Semivolatile Organics																													
Benzo(a)anthracene	0.00E+00	mg/L	1.43E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.45E+00		1.47E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.29E-03	0.00E+00	0.00E+00	0.00E+00	6.29E-03	1.00E+00	6.29E-03	1.00E+01	6.29E-04
Benzo(a)pyrene	0.00E+00	mg/L	1.58E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.59E+00		1.33E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-03	0.00E+00	0.00E+00	0.00E+00	6.31E-03	1.00E+00	6.31E-03	1.00E+01	6.31E-04
Pyrene	0.00E+00	mg/L	2.06E-01	mg/kg	0.00E+00	mg/kg	1.00E+00		1.49E+00		7.20E-01				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-02	0.00E+00	0.00E+00	0.00E+00	4.45E-02	7.50E+00	5.93E-03	3.75E+01	1.19E-03

Intake Equation:

$$Ej = \left(\frac{A}{HR} \left[\sum_{i=1}^{m} \left(\frac{IRi\,xCij}{BW} \right) \right] \right)$$

Where:
Ej = Total Exposure to Chemical
A = Site Area
HR = Home Range
m = Total number of ingested media
i = counter
IRi = Consumption Rate for Medium
Cij = Chemical concentration (j) in medium (I) (mg/kg or mg/L)
BW = Body Weight

Notes:
BAF = Bioaccumulation Factor (may be BCF if this is the only value available)
EED = Estimated Exposure Dose
HQ = Hazard Quotient.
L = LOAEL based; N = NOAEL based
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NA = Not applicable/Not available
BAF (or BCF) values from appropriate text tables (BCF = bioconcentration factor)
Some BAF (or BCF) values based on media regression equations (value in box):
LOAEL and NOAEL values from appropriate toxicity summary tables in the text.
UF = Uncertainty Factor for toxicity factor extrapolation, and Adjusted LOAEL or N See appropriate text tables for equations.
A "0" entry in the exposure concentration column indicates this chemical not selected as a COPEC for this medium.
Receptor diet data and home range data from appropriate text table.
Exposure point concentrations (EPCs) from appropriate text tables.

Species-Specific Factors

Terrestrial plant diet fraction =	0	unitless
Aquatic plant diet fraction =	1	unitless
Plant root diet fraction =	0	unitless
Fish diet fraction =	0	unitless
Aq. Invert diet fraction =	0	unitless
Terr. Invert diet fraction =	0	unitless
Mammal diet fraction =	0	unitless
Bird diet fraction =	0	unitless
Soil ingestion rate =	0	kg/d
Sediment ingestion rate =	0	kg/d
Food ingestion rate =	0.352	kg/d
Body weight =	1.174	kg
Home range =	0.3	acres
Water intake rate =	0.11	L/d
Site Area =	2	acres
Area Use Factor (AUF) =	1	unitless
Exposure Frequency (EF) =	1	unitless

APPENDIX F

DATA USED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
3-Methylphenol and 4-Methylphenol	65794-96-9	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
3-Methylphenol and 4-Methylphenol	65794-96-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
3-Methylphenol and 4-Methylphenol	65794-96-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
3-Methylphenol and 4-Methylphenol	65794-96-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
3-Methylphenol and 4-Methylphenol	65794-96-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
3-Methylphenol and 4-Methylphenol	65794-96-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
3-Methylphenol and 4-Methylphenol	65794-96-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
3-Methylphenol and 4-Methylphenol	65794-96-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
3-Methylphenol and 4-Methylphenol	65794-96-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
3-Methylphenol and 4-Methylphenol	65794-96-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
3-Methylphenol and 4-Methylphenol	65794-96-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
3-Methylphenol and 4-Methylphenol	65794-96-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
3-Methylphenol and 4-Methylphenol	65794-96-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
3-Methylphenol and 4-Methylphenol	65794-96-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
3-Methylphenol and 4-Methylphenol	65794-96-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
3-Methylphenol and 4-Methylphenol	65794-96-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Acenaphthene	83-32-9	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Acenaphthene	83-32-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Acenaphthene	83-32-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Acenaphthene	83-32-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Acenaphthene	83-32-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Acenaphthene	83-32-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Acenaphthene	83-32-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Acenaphthene	83-32-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Acenaphthene	83-32-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Acenaphthene	83-32-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Acenaphthene	83-32-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Acenaphthene	83-32-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Acenaphthene	83-32-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Acenaphthene	83-32-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Acenaphthene	83-32-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Acenaphthene	83-32-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Acenaphthylene	208-96-8	0.0516	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Acenaphthylene	208-96-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Acenaphthylene	208-96-8	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Acenaphthylene	208-96-8	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Acenaphthylene	208-96-8	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Acenaphthylene	208-96-8	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Acenaphthylene	208-96-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Acenaphthylene	208-96-8	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Acenaphthylene	208-96-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Acenaphthylene	208-96-8	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Acenaphthylene	208-96-8	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Acenaphthylene	208-96-8	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Acenaphthylene	208-96-8	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Acenaphthylene	208-96-8	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Acenaphthylene	208-96-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Acenaphthylene	208-96-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Aluminum	7429-90-5	5060	mg/kg	0.79	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		14
Aluminum	7429-90-5	7010	mg/kg	0.68	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		12
Aluminum	7429-90-5	7580	mg/kg	0.69	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		13
Aluminum	7429-90-5	10400	mg/kg	1.5	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		27
Aluminum	7429-90-5	8820	mg/kg	1.4	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		25
Aluminum	7429-90-5	8240	mg/kg	1.6		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		29
Aluminum	7429-90-5	4870	mg/kg	0.64		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		12
Aluminum	7429-90-5	9350	mg/kg	1.4		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		26
Aluminum	7429-90-5	6010	mg/kg	0.68		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		12
Aluminum	7429-90-5	8770	mg/kg	0.86		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		16
Aluminum	7429-90-5	11400	mg/kg	1.1		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		20
Aluminum	7429-90-5	4760	mg/kg	1		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		18
Aluminum	7429-90-5	9765	mg/kg	0.7		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		13
Aluminum	7429-90-5	8970	mg/kg	1.6		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		28.5
Aluminum	7429-90-5	8970	mg/kg	0.65		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		12
Aluminum	7429-90-5	7840	mg/kg	0.67		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		12
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.045	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.075	mg/kg	0.038	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.04	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.044	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.047	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.085	mg/kg	0.044	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.039	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.045	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.044	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.075	mg/kg	0.038	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.095	mg/kg	0.048	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.0405	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.085	mg/kg	0.0425	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	40046	0.3	1	UU	0.17
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.07	mg/kg	0.036	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.075	mg/kg	0.083	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.087	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.096	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.1	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.085	mg/kg	0.095	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.086	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.098	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.096	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.087	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.075	mg/kg	0.084	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.095	mg/kg	0.1	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.0885	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.085	mg/kg	0.093	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	40046	0.3	1	UU	0.17
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.07	mg/kg	0.079	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.088	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Anthracene	120-12-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Anthracene	120-12-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Anthracene	120-12-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Anthracene	120-12-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Anthracene	120-12-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Anthracene	120-12-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Anthracene	120-12-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Anthracene	120-12-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Anthracene	120-12-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Anthracene	120-12-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Anthracene	120-12-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Anthracene	120-12-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Anthracene	120-12-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Anthracene	120-12-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Anthracene	120-12-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Anthracene	120-12-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Antimony	7440-36-0	2.15	mg/kg	0.32	UJ	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	U	4.3
Antimony	7440-36-0	3.7	mg/kg	0.56	UJ	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	U	7.4
Antimony	7440-36-0	1.9	mg/kg	0.28	UJ	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	U	3.8
Antimony	7440-36-0	4.05	mg/kg	0.61	UJ	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	U	8.1
Antimony	7440-36-0	3.8	mg/kg	0.57	UJ	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	U	7.6
Antimony	7440-36-0	4.4	mg/kg	0.66	U	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	U	8.8
Antimony	7440-36-0	3.5	mg/kg	0.53	U	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	U	7
Antimony	7440-36-0	3.9	mg/kg	0.58	U	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	U	7.8
Antimony	7440-36-0	0.67	mg/kg	0.56	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	7.4
Antimony	7440-36-0	1.2	mg/kg	0.7	J	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	B	9.3
Antimony	7440-36-0	1.3	mg/kg	0.89	J	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	B	12
Antimony	7440-36-0	2.75	mg/kg	0.42	U	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	U	5.5
Antimony	7440-36-0	2.26	mg/kg	0.57	JU	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BU	7.6
Antimony	7440-36-0	2.34	mg/kg	0.65	/UJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1	UB	8.65
Antimony	7440-36-0	0.5	mg/kg	0.27	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	3.5
Antimony	7440-36-0	0.93	mg/kg	0.55	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	7.3
Aroclor 1016	12674-11-2	0.0125	mg/kg	0.012	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1016	12674-11-2	0.0105	mg/kg	0.01	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1016	12674-11-2	0.011	mg/kg	0.011	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1016	12674-11-2	0.0235	mg/kg	0.023	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1016	12674-11-2	0.0215	mg/kg	0.022	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1016	12674-11-2	0.025	mg/kg	0.025	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05
Aroclor 1016	12674-11-2	0.0105	mg/kg	0.01	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1016	12674-11-2	0.022	mg/kg	0.022	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1016	12674-11-2	0.011	mg/kg	0.011	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1016	12674-11-2	0.0135	mg/kg	0.013	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1016	12674-11-2	0.0175	mg/kg	0.017	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1016	12674-11-2	0.0155	mg/kg	0.016	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1016	12674-11-2	0.0105	mg/kg	0.011	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1016	12674-11-2	0.02475	mg/kg	0.025	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1016	12674-11-2	0.0105	mg/kg	0.01	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1016	12674-11-2	0.0105	mg/kg	0.011	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1221	11104-28-2	0.0125	mg/kg	0.02	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1221	11104-28-2	0.0105	mg/kg	0.017	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1221	11104-28-2	0.011	mg/kg	0.017	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1221	11104-28-2	0.0235	mg/kg	0.037	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1221	11104-28-2	0.0215	mg/kg	0.035	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1221	11104-28-2	0.025	mg/kg	0.04	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Aroclor 1221	11104-28-2	0.0105	mg/kg	0.017	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1221	11104-28-2	0.022	mg/kg	0.035	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1221	11104-28-2	0.011	mg/kg	0.017	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1221	11104-28-2	0.0135	mg/kg	0.021	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1221	11104-28-2	0.0175	mg/kg	0.028	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1221	11104-28-2	0.0155	mg/kg	0.025	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1221	11104-28-2	0.0105	mg/kg	0.017	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1221	11104-28-2	0.02475	mg/kg	0.0395	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1221	11104-28-2	0.0105	mg/kg	0.017	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1221	11104-28-2	0.0105	mg/kg	0.017	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1232	11141-16-5	0.0125	mg/kg	0.02	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1232	11141-16-5	0.0105	mg/kg	0.017	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1232	11141-16-5	0.011	mg/kg	0.017	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1232	11141-16-5	0.0235	mg/kg	0.037	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1232	11141-16-5	0.0215	mg/kg	0.035	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1232	11141-16-5	0.025	mg/kg	0.04	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05
Aroclor 1232	11141-16-5	0.0105	mg/kg	0.017	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1232	11141-16-5	0.022	mg/kg	0.035	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1232	11141-16-5	0.011	mg/kg	0.017	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1232	11141-16-5	0.0135	mg/kg	0.021	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1232	11141-16-5	0.0175	mg/kg	0.028	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1232	11141-16-5	0.0155	mg/kg	0.025	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1232	11141-16-5	0.0105	mg/kg	0.017	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1232	11141-16-5	0.02475	mg/kg	0.0395	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1232	11141-16-5	0.0105	mg/kg	0.017	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1232	11141-16-5	0.0105	mg/kg	0.017	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1242	53469-21-9	0.0125	mg/kg	0.012	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1242	53469-21-9	0.0105	mg/kg	0.01	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1242	53469-21-9	0.011	mg/kg	0.011	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1242	53469-21-9	0.0235	mg/kg	0.023	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1242	53469-21-9	0.0215	mg/kg	0.022	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1242	53469-21-9	0.025	mg/kg	0.025	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05
Aroclor 1242	53469-21-9	0.0105	mg/kg	0.01	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1242	53469-21-9	0.022	mg/kg	0.022	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1242	53469-21-9	0.011	mg/kg	0.011	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1242	53469-21-9	0.0135	mg/kg	0.013	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1242	53469-21-9	0.0175	mg/kg	0.017	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1242	53469-21-9	0.0155	mg/kg	0.016	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1242	53469-21-9	0.0105	mg/kg	0.011	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1242	53469-21-9	0.02475	mg/kg	0.025	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1242	53469-21-9	0.0105	mg/kg	0.01	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1242	53469-21-9	0.0105	mg/kg	0.011	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1248	12672-29-6	0.0125	mg/kg	0.012	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1248	12672-29-6	0.0105	mg/kg	0.01	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1248	12672-29-6	0.011	mg/kg	0.011	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1248	12672-29-6	0.0235	mg/kg	0.023	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1248	12672-29-6	0.0215	mg/kg	0.022	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1248	12672-29-6	0.025	mg/kg	0.025	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05
Aroclor 1248	12672-29-6	0.0105	mg/kg	0.01	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1248	12672-29-6	0.022	mg/kg	0.022	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1248	12672-29-6	0.011	mg/kg	0.011	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1248	12672-29-6	0.0135	mg/kg	0.013	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1248	12672-29-6	0.0175	mg/kg	0.017	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1248	12672-29-6	0.0155	mg/kg	0.016	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1248	12672-29-6	0.0105	mg/kg	0.011	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1248	12672-29-6	0.02475	mg/kg	0.025	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1248	12672-29-6	0.0105	mg/kg	0.01	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1248	12672-29-6	0.0105	mg/kg	0.011	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1254	11097-69-1	0.0125	mg/kg	0.012	U	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	U	0.025
Aroclor 1254	11097-69-1	0.0105	mg/kg	0.01	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1254	11097-69-1	0.011	mg/kg	0.011	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1254	11097-69-1	0.0235	mg/kg	0.023	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1254	11097-69-1	0.0215	mg/kg	0.022	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1254	11097-69-1	0.025	mg/kg	0.025	U	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	U	0.05
Aroclor 1254	11097-69-1	0.0105	mg/kg	0.01	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1254	11097-69-1	0.022	mg/kg	0.022	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1254	11097-69-1	0.011	mg/kg	0.011	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1254	11097-69-1	0.0135	mg/kg	0.013	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1254	11097-69-1	0.0175	mg/kg	0.017	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1254	11097-69-1	0.0155	mg/kg	0.016	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1254	11097-69-1	0.0105	mg/kg	0.011	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1254	11097-69-1	0.02475	mg/kg	0.025	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1254	11097-69-1	0.0105	mg/kg	0.01	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1254	11097-69-1	0.0105	mg/kg	0.011	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Aroclor 1260	11096-82-5	0.015	mg/kg	0.012	J	ASH PIT 3-SB01	AP0032	PCB	REG	19-Aug-09	0	1	J	0.025

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Aroclor 1260	11096-82-5	0.0105	mg/kg	0.01	U	ASH PIT 3-SB01	AP0033	PCB	REG	19-Aug-09	3	5	U	0.021
Aroclor 1260	11096-82-5	0.011	mg/kg	0.011	U	ASH PIT 3-SB02	AP0036	PCB	REG	19-Aug-09	0	1	U	0.022
Aroclor 1260	11096-82-5	0.0235	mg/kg	0.023	U	ASH PIT 3-SB02	AP0037	PCB	REG	19-Aug-09	1.2	2.3	U	0.047
Aroclor 1260	11096-82-5	0.0215	mg/kg	0.022	U	ASH PIT 3-SB03	AP0039	PCB	REG	19-Aug-09	0.2	1.7	U	0.043
Aroclor 1260	11096-82-5	0.043	mg/kg	0.025	J	ASH PIT 3-SB04	AP0042	PCB	REG	21-Aug-09	0.3	0.8	J	0.05
Aroclor 1260	11096-82-5	0.0105	mg/kg	0.01	U	ASH PIT 3-SB04	AP0043	PCB	REG	21-Aug-09	0.8	1.5	U	0.021
Aroclor 1260	11096-82-5	0.022	mg/kg	0.022	U	ASH PIT 3-SB05	AP0045	PCB	REG	21-Aug-09	0.3	1	U	0.044
Aroclor 1260	11096-82-5	0.011	mg/kg	0.011	U	ASH PIT 3-SB05	AP0046	PCB	REG	21-Aug-09	1	2	U	0.022
Aroclor 1260	11096-82-5	0.0135	mg/kg	0.013	U	ASH PIT 3-SB06	AP0048	PCB	REG	20-Aug-09	0.2	1	U	0.027
Aroclor 1260	11096-82-5	0.0175	mg/kg	0.017	U	ASH PIT 3-SB06	AP0049	PCB	REG	20-Aug-09	1	2	U	0.035
Aroclor 1260	11096-82-5	0.0155	mg/kg	0.016	U	ASH PIT 3-SB07	AP0051	PCB	REG	21-Aug-09	0	1	U	0.031
Aroclor 1260	11096-82-5	0.0105	mg/kg	0.011	UU	ASH PIT 3-SB07	AP0052AP0059	PCB	REGFD	40046	1	2	UU	0.021
Aroclor 1260	11096-82-5	0.02475	mg/kg	0.025	UU	ASH PIT 3-SB08	AP0054AP0056	PCB	REGFD	40046	0.3	1	UU	0.0495
Aroclor 1260	11096-82-5	0.0105	mg/kg	0.01	U	ASH PIT 3-SB08	AP0055	PCB	REG	21-Aug-09	3	5	U	0.021
Aroclor 1260	11096-82-5	0.0105	mg/kg	0.011	U	ASH PIT 3-SB06	AP0061A	PCB	REG	20-Aug-09	2	2.7	U	0.021
Arsenic	7440-38-2	7.7	mg/kg	0.26		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		0.58
Arsenic	7440-38-2	5	mg/kg	0.45		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		0.99
Arsenic	7440-38-2	4.9	mg/kg	0.23		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		0.5
Arsenic	7440-38-2	12.9	mg/kg	0.48		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		1.1
Arsenic	7440-38-2	12.4	mg/kg	0.45		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		1
Arsenic	7440-38-2	29	mg/kg	0.53		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		1.2
Arsenic	7440-38-2	8.5	mg/kg	0.42		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		0.93
Arsenic	7440-38-2	13.7	mg/kg	0.47		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		1
Arsenic	7440-38-2	20.3	mg/kg	0.45		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		0.99
Arsenic	7440-38-2	12.7	mg/kg	0.56		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		1.2
Arsenic	7440-38-2	16.7	mg/kg	0.71		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		1.6
Arsenic	7440-38-2	7.7	mg/kg	0.33		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		0.74
Arsenic	7440-38-2	8.1	mg/kg	0.46		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		1
Arsenic	7440-38-2	44.05	mg/kg	0.52		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		1.15
Arsenic	7440-38-2	32.7	mg/kg	0.21		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		0.47
Arsenic	7440-38-2	30.6	mg/kg	0.44		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		0.97
Barium	7440-39-3	59	mg/kg	0.36		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		14
Barium	7440-39-3	41.2	mg/kg	0.31		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		12
Barium	7440-39-3	48.1	mg/kg	0.31		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		13
Barium	7440-39-3	85.7	mg/kg	0.67		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		27
Barium	7440-39-3	90.7	mg/kg	0.63		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		25
Barium	7440-39-3	127	mg/kg	0.74		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		29
Barium	7440-39-3	41.5	mg/kg	0.29		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		12
Barium	7440-39-3	82.2	mg/kg	0.65		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		26
Barium	7440-39-3	63.7	mg/kg	0.31		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		12
Barium	7440-39-3	203	mg/kg	0.39		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		16
Barium	7440-39-3	113	mg/kg	0.5		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		20
Barium	7440-39-3	38.5	mg/kg	0.46		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		18
Barium	7440-39-3	70.3	mg/kg	0.32		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		13
Barium	7440-39-3	96.75	mg/kg	0.72		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		28.5
Barium	7440-39-3	98.4	mg/kg	0.3		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		12
Barium	7440-39-3	65.1	mg/kg	0.3		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		12
Benzo(a)anthracene	56-55-3	0.156	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Benzo(a)anthracene	56-55-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzo(a)anthracene	56-55-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzo(a)anthracene	56-55-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzo(a)anthracene	56-55-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzo(a)anthracene	56-55-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Benzo(a)anthracene	56-55-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzo(a)anthracene	56-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzo(a)anthracene	56-55-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzo(a)anthracene	56-55-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzo(a)anthracene	56-55-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Benzo(a)anthracene	56-55-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzo(a)anthracene	56-55-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzo(a)anthracene	56-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzo(a)anthracene	56-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Benzo(a)pyrene	50-32-8	0.168	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Benzo(a)pyrene	50-32-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzo(a)pyrene	50-32-8	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzo(a)pyrene	50-32-8	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzo(a)pyrene	50-32-8	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzo(a)pyrene	50-32-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Benzo(a)pyrene	50-32-8	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzo(a)pyrene	50-32-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzo(a)pyrene	50-32-8	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzo(a)pyrene	50-32-8	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzo(a)pyrene	50-32-8	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Benzo(a)pyrene	50-32-8	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzo(a)pyrene	50-32-8	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzo(a)pyrene	50-32-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzo(a)pyrene	50-32-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Benzo(b)fluoranthene	205-99-2	0.268	mg/kg	0.049		ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1		0.25
Benzo(b)fluoranthene	205-99-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzo(b)fluoranthene	205-99-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzo(b)fluoranthene	205-99-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzo(b)fluoranthene	205-99-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzo(b)fluoranthene	205-99-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Benzo(b)fluoranthene	205-99-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzo(b)fluoranthene	205-99-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzo(b)fluoranthene	205-99-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzo(b)fluoranthene	205-99-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzo(b)fluoranthene	205-99-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Benzo(b)fluoranthene	205-99-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzo(b)fluoranthene	205-99-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzo(b)fluoranthene	205-99-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzo(b)fluoranthene	205-99-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Benzo(ghi)perylene	191-24-2	0.0882	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Benzo(ghi)perylene	191-24-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzo(ghi)perylene	191-24-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzo(ghi)perylene	191-24-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzo(ghi)perylene	191-24-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzo(ghi)perylene	191-24-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Benzo(ghi)perylene	191-24-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzo(ghi)perylene	191-24-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzo(ghi)perylene	191-24-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzo(ghi)perylene	191-24-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzo(ghi)perylene	191-24-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Benzo(ghi)perylene	191-24-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzo(ghi)perylene	191-24-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzo(ghi)perylene	191-24-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzo(ghi)perylene	191-24-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Benzo(k)fluoranthene	207-08-9	0.0972	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Benzo(k)fluoranthene	207-08-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzo(k)fluoranthene	207-08-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzo(k)fluoranthene	207-08-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzo(k)fluoranthene	207-08-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzo(k)fluoranthene	207-08-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Benzo(k)fluoranthene	207-08-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzo(k)fluoranthene	207-08-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzo(k)fluoranthene	207-08-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzo(k)fluoranthene	207-08-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzo(k)fluoranthene	207-08-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Benzo(k)fluoranthene	207-08-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzo(k)fluoranthene	207-08-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzo(k)fluoranthene	207-08-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzo(k)fluoranthene	207-08-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Benzoic acid	65-85-0	0.6	mg/kg	0.49	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.2
Benzoic acid	65-85-0	0.5	mg/kg	0.41	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	1
Benzoic acid	65-85-0	0.55	mg/kg	0.43	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.1
Benzoic acid	65-85-0	1.15	mg/kg	0.92	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	2.3
Benzoic acid	65-85-0	1.05	mg/kg	0.85	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	2.1
Benzoic acid	65-85-0	1.25	mg/kg	0.99	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	2.5
Benzoic acid	65-85-0	0.5	mg/kg	0.41	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	1
Benzoic acid	65-85-0	1.1	mg/kg	0.87	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	2.2
Benzoic acid	65-85-0	0.5	mg/kg	0.42	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	1
Benzoic acid	65-85-0	0.65	mg/kg	0.52	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	1.3
Benzoic acid	65-85-0	0.85	mg/kg	0.68	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	1.7
Benzoic acid	65-85-0	0.8	mg/kg	0.63	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	1.6
Benzoic acid	65-85-0	0.55	mg/kg	0.425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	1.1
Benzoic acid	65-85-0	1.25	mg/kg	0.99	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	2.5
Benzoic acid	65-85-0	0.5	mg/kg	0.42	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	1
Benzoic acid	65-85-0	0.5	mg/kg	0.42	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	1
Benzyl alcohol	100-51-6	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Benzyl alcohol	100-51-6	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Benzyl alcohol	100-51-6	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Benzyl alcohol	100-51-6	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Benzyl alcohol	100-51-6	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Benzyl alcohol	100-51-6	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Benzyl alcohol	100-51-6	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Benzyl alcohol	100-51-6	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Benzyl alcohol	100-51-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Benzyl alcohol	100-51-6	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Benzyl alcohol	100-51-6	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Benzyl alcohol	100-51-6	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Benzyl alcohol	100-51-6	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Benzyl alcohol	100-51-6	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Benzyl alcohol	100-51-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Benzyl alcohol	100-51-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Beryllium	7440-41-7	0.69	mg/kg	0.072		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		0.36
Beryllium	7440-41-7	0.5	mg/kg	0.062		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		0.31
Beryllium	7440-41-7	0.57	mg/kg	0.063		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		0.31
Beryllium	7440-41-7	1.5	mg/kg	0.13		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		0.67
Beryllium	7440-41-7	1.7	mg/kg	0.13		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		0.63
Beryllium	7440-41-7	2.1	mg/kg	0.15		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		0.74
Beryllium	7440-41-7	0.4	mg/kg	0.058		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		0.29
Beryllium	7440-41-7	1.5	mg/kg	0.13		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		0.65
Beryllium	7440-41-7	0.47	mg/kg	0.062		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		0.31
Beryllium	7440-41-7	0.74	mg/kg	0.078		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		0.39
Beryllium	7440-41-7	0.92	mg/kg	0.099		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		0.5
Beryllium	7440-41-7	0.41	mg/kg	0.092	J	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	B	0.46
Beryllium	7440-41-7	0.65	mg/kg	0.063		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		0.32
Beryllium	7440-41-7	1.8	mg/kg	0.145		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		0.72
Beryllium	7440-41-7	0.64	mg/kg	0.059		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		0.3
Beryllium	7440-41-7	0.56	mg/kg	0.061		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		0.3
Bis(2-chloroethoxy)methane	111-91-1	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Bis(2-chloroethoxy)methane	111-91-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Bis(2-chloroethoxy)methane	111-91-1	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Bis(2-chloroethoxy)methane	111-91-1	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Bis(2-chloroethoxy)methane	111-91-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Bis(2-chloroethoxy)methane	111-91-1	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Bis(2-chloroethoxy)methane	111-91-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Bis(2-chloroethoxy)methane	111-91-1	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Bis(2-chloroethoxy)methane	111-91-1	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Bis(2-chloroethoxy)methane	111-91-1	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Bis(2-chloroethoxy)methane	111-91-1	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Bis(2-chloroethoxy)methane	111-91-1	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Bis(2-chloroethoxy)methane	111-91-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Bis(2-chloroethoxy)methane	111-91-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Bis(2-chloroethyl)ether	111-44-4	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Bis(2-chloroethyl)ether	111-44-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Bis(2-chloroethyl)ether	111-44-4	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Bis(2-chloroethyl)ether	111-44-4	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Bis(2-chloroethyl)ether	111-44-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Bis(2-chloroethyl)ether	111-44-4	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Bis(2-chloroethyl)ether	111-44-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Bis(2-chloroethyl)ether	111-44-4	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Bis(2-chloroethyl)ether	111-44-4	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Bis(2-chloroethyl)ether	111-44-4	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Bis(2-chloroethyl)ether	111-44-4	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Bis(2-chloroethyl)ether	111-44-4	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Bis(2-chloroethyl)ether	111-44-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Bis(2-chloroethyl)ether	111-44-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Bis(2-chloroisopropyl)ether	108-60-1	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Bis(2-chloroisopropyl)ether	108-60-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Bis(2-chloroisopropyl)ether	108-60-1	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Bis(2-chloroisopropyl)ether	108-60-1	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Bis(2-chloroisopropyl)ether	108-60-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Bis(2-chloroisopropyl)ether	108-60-1	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Bis(2-chloroisopropyl)ether	108-60-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Bis(2-chloroisopropyl)ether	108-60-1	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Bis(2-chloroisopropyl)ether	108-60-1	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Bis(2-chloroisopropyl)ether	108-60-1	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Bis(2-chloroisopropyl)ether	108-60-1	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Bis(2-chloroisopropyl)ether	108-60-1	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Bis(2-chloroisopropyl)ether	108-60-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Bis(2-chloroisopropyl)ether	108-60-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Bis(2-ethylhexyl)phthalate	117-81-7	0.245	mg/kg	0.25	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Bis(2-ethylhexyl)phthalate	117-81-7	0.205	mg/kg	0.2	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Bis(2-ethylhexyl)phthalate	117-81-7	0.215	mg/kg	0.21	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Bis(2-ethylhexyl)phthalate	117-81-7	0.46	mg/kg	0.46	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Bis(2-ethylhexyl)phthalate	117-81-7	0.425	mg/kg	0.43	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Bis(2-ethylhexyl)phthalate	117-81-7	0.495	mg/kg	0.49	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Bis(2-ethylhexyl)phthalate	117-81-7	0.205	mg/kg	0.2	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Bis(2-ethylhexyl)phthalate	117-81-7	0.435	mg/kg	0.43	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Bis(2-ethylhexyl)phthalate	117-81-7	0.21	mg/kg	0.21	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Bis(2-ethylhexyl)phthalate	117-81-7	0.26	mg/kg	0.26	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Bis(2-ethylhexyl)phthalate	117-81-7	0.34	mg/kg	0.34	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Bis(2-ethylhexyl)phthalate	117-81-7	0.315	mg/kg	0.31	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Bis(2-ethylhexyl)phthalate	117-81-7	0.2125	mg/kg	0.215	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Bis(2-ethylhexyl)phthalate	117-81-7	0.495	mg/kg	0.495	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.99
Bis(2-ethylhexyl)phthalate	117-81-7	0.21	mg/kg	0.21	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Bis(2-ethylhexyl)phthalate	117-81-7	0.21	mg/kg	0.21	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Bromophenyl phenyl ether, 4-	101-55-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Bromophenyl phenyl ether, 4-	101-55-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Bromophenyl phenyl ether, 4-	101-55-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Bromophenyl phenyl ether, 4-	101-55-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Bromophenyl phenyl ether, 4-	101-55-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Bromophenyl phenyl ether, 4-	101-55-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Bromophenyl phenyl ether, 4-	101-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Bromophenyl phenyl ether, 4-	101-55-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Bromophenyl phenyl ether, 4-	101-55-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Bromophenyl phenyl ether, 4-	101-55-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Bromophenyl phenyl ether, 4-	101-55-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Bromophenyl phenyl ether, 4-	101-55-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Bromophenyl phenyl ether, 4-	101-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Bromophenyl phenyl ether, 4-	101-55-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Butyl benzyl phthalate	85-68-7	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Butyl benzyl phthalate	85-68-7	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Butyl benzyl phthalate	85-68-7	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Butyl benzyl phthalate	85-68-7	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Butyl benzyl phthalate	85-68-7	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Butyl benzyl phthalate	85-68-7	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Butyl benzyl phthalate	85-68-7	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Butyl benzyl phthalate	85-68-7	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Butyl benzyl phthalate	85-68-7	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Butyl benzyl phthalate	85-68-7	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Butyl benzyl phthalate	85-68-7	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Butyl benzyl phthalate	85-68-7	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Butyl benzyl phthalate	85-68-7	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Butyl benzyl phthalate	85-68-7	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.99
Butyl benzyl phthalate	85-68-7	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Butyl benzyl phthalate	85-68-7	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Cadmium	7440-43-9	0.33	mg/kg	0.072		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		0.29
Cadmium	7440-43-9	0.18	mg/kg	0.062	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	B	0.25
Cadmium	7440-43-9	0.125	mg/kg	0.063	U	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	U	0.25
Cadmium	7440-43-9	0.27	mg/kg	0.13	U	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	U	0.54
Cadmium	7440-43-9	0.25	mg/kg	0.13	U	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	U	0.5
Cadmium	7440-43-9	0.3	mg/kg	0.15	J	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	B	0.59
Cadmium	7440-43-9	0.2	mg/kg	0.058	J	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	B	0.23
Cadmium	7440-43-9	0.26	mg/kg	0.13	U	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	U	0.52
Cadmium	7440-43-9	0.21	mg/kg	0.062	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	0.25
Cadmium	7440-43-9	1.55	mg/kg	1.6	U	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	U	3.1
Cadmium	7440-43-9	2	mg/kg	2	U	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	U	4
Cadmium	7440-43-9	0.44	mg/kg	0.092		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		0.37
Cadmium	7440-43-9	0.2	mg/kg	0.063	JJ	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BB	0.25
Cadmium	7440-43-9	0.9525	mg/kg	0.865	UU	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1	UU	1.905
Cadmium	7440-43-9	0.14	mg/kg	0.059	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	0.24
Cadmium	7440-43-9	0.17	mg/kg	0.061	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	0.24
Calcium	7440-70-2	8460	mg/kg	7.2	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		360
Calcium	7440-70-2	49300	mg/kg	12	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		620
Calcium	7440-70-2	11700	mg/kg	6.3	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		310
Calcium	7440-70-2	9690	mg/kg	13	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		670
Calcium	7440-70-2	11200	mg/kg	13	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		630
Calcium	7440-70-2	15900	mg/kg	15		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		740
Calcium	7440-70-2	47500	mg/kg	12		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		580
Calcium	7440-70-2	12800	mg/kg	13		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		650
Calcium	7440-70-2	52800	mg/kg	12		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		620
Calcium	7440-70-2	2060	mg/kg	7.8		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		390
Calcium	7440-70-2	3200	mg/kg	9.9		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		500
Calcium	7440-70-2	14100	mg/kg	9.2		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		460
Calcium	7440-70-2	45100	mg/kg	13		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		630

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Calcium	7440-70-2	16300	mg/kg	14.5		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		720
Calcium	7440-70-2	28000	mg/kg	5.9		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		300
Calcium	7440-70-2	46100	mg/kg	12		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		610
Carbazole	86-74-8	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Carbazole	86-74-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Carbazole	86-74-8	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Carbazole	86-74-8	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Carbazole	86-74-8	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Carbazole	86-74-8	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Carbazole	86-74-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Carbazole	86-74-8	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Carbazole	86-74-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Carbazole	86-74-8	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Carbazole	86-74-8	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Carbazole	86-74-8	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Carbazole	86-74-8	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Carbazole	86-74-8	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Carbazole	86-74-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Carbazole	86-74-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chloro-3-methylphenol, 4-	59-50-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Chloro-3-methylphenol, 4-	59-50-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chloro-3-methylphenol, 4-	59-50-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chloro-3-methylphenol, 4-	59-50-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chloro-3-methylphenol, 4-	59-50-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chloro-3-methylphenol, 4-	59-50-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Chloro-3-methylphenol, 4-	59-50-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chloro-3-methylphenol, 4-	59-50-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chloro-3-methylphenol, 4-	59-50-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chloro-3-methylphenol, 4-	59-50-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chloro-3-methylphenol, 4-	59-50-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chloro-3-methylphenol, 4-	59-50-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chloro-3-methylphenol, 4-	59-50-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chloro-3-methylphenol, 4-	59-50-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chloroaniline, 4-	106-47-8	0.125	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Chloroaniline, 4-	106-47-8	0.1	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chloroaniline, 4-	106-47-8	0.105	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chloroaniline, 4-	106-47-8	0.23	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chloroaniline, 4-	106-47-8	0.245	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chloroaniline, 4-	106-47-8	0.1	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chloroaniline, 4-	106-47-8	0.215	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Chloroaniline, 4-	106-47-8	0.105	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chloroaniline, 4-	106-47-8	0.13	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chloroaniline, 4-	106-47-8	0.17	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chloroaniline, 4-	106-47-8	0.155	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chloroaniline, 4-	106-47-8	0.1075	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chloroaniline, 4-	106-47-8	0.2475	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chloroaniline, 4-	106-47-8	0.105	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chloroaniline, 4-	106-47-8	0.105	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chloronaphthalene, 2-	91-58-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Chloronaphthalene, 2-	91-58-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chloronaphthalene, 2-	91-58-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chloronaphthalene, 2-	91-58-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chloronaphthalene, 2-	91-58-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chloronaphthalene, 2-	91-58-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chloronaphthalene, 2-	91-58-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Chloronaphthalene, 2-	91-58-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chloronaphthalene, 2-	91-58-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chloronaphthalene, 2-	91-58-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chloronaphthalene, 2-	91-58-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chloronaphthalene, 2-	91-58-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chloronaphthalene, 2-	91-58-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chloronaphthalene, 2-	91-58-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chloronaphthalene, 2-	91-58-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chlorophenol, 2-	95-57-8	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Chlorophenol, 2-	95-57-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chlorophenol, 2-	95-57-8	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chlorophenol, 2-	95-57-8	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chlorophenol, 2-	95-57-8	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chlorophenol, 2-	95-57-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chlorophenol, 2-	95-57-8	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Chlorophenol, 2-	95-57-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chlorophenol, 2-	95-57-8	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chlorophenol, 2-	95-57-8	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chlorophenol, 2-	95-57-8	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chlorophenol, 2-	95-57-8	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chlorophenol, 2-	95-57-8	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chlorophenol, 2-	95-57-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chlorophenol, 2-	95-57-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chlorophenyl phenyl ether, 4-	7005-72-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Chlorophenyl phenyl ether, 4-	7005-72-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chlorophenyl phenyl ether, 4-	7005-72-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chlorophenyl phenyl ether, 4-	7005-72-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chlorophenyl phenyl ether, 4-	7005-72-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chlorophenyl phenyl ether, 4-	7005-72-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Chlorophenyl phenyl ether, 4-	7005-72-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chlorophenyl phenyl ether, 4-	7005-72-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chlorophenyl phenyl ether, 4-	7005-72-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chlorophenyl phenyl ether, 4-	7005-72-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chlorophenyl phenyl ether, 4-	7005-72-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chlorophenyl phenyl ether, 4-	7005-72-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chlorophenyl phenyl ether, 4-	7005-72-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chlorophenyl phenyl ether, 4-	7005-72-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Chromium	7440-47-3	8.8	mg/kg	0.24	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		1.4
Chromium	7440-47-3	10.3	mg/kg	0.198	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		1.2
Chromium	7440-47-3	11	mg/kg	0.2	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		1.3
Chromium	7440-47-3	14.9	mg/kg	0.44	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		2.6
Chromium	7440-47-3	14.3	mg/kg	0.4	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		2.6
Chromium	7440-47-3	15.5	mg/kg	0.48		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		3
Chromium	7440-47-3	7.7	mg/kg	0.186		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		1.2
Chromium	7440-47-3	13.6	mg/kg	0.42		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		2.6
Chromium	7440-47-3	9.6	mg/kg	0.198		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		1.2
Chromium	7440-47-3	9.6	mg/kg	0.24		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		1.6
Chromium	7440-47-3	12	mg/kg	0.32		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		2
Chromium	7440-47-3	6.9	mg/kg	0.3		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		1.8
Chromium	7440-47-3	14.75	mg/kg	0.2		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		1.3
Chromium	7440-47-3	16.55	mg/kg	0.46		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		2.9
Chromium	7440-47-3	12.6	mg/kg	0.19		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		1.2
Chromium	7440-47-3	11.8	mg/kg	0.194		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		1.2
Chrysene	218-01-9	0.19	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Chrysene	218-01-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Chrysene	218-01-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Chrysene	218-01-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Chrysene	218-01-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Chrysene	218-01-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Chrysene	218-01-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Chrysene	218-01-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Chrysene	218-01-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Chrysene	218-01-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Chrysene	218-01-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Chrysene	218-01-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Chrysene	218-01-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Chrysene	218-01-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Chrysene	218-01-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Chrysene	218-01-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Cobalt	7440-48-4	4.5	mg/kg	0.06	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		3.6
Cobalt	7440-48-4	6.7	mg/kg	0.051	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		3.1
Cobalt	7440-48-4	5.7	mg/kg	0.052	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		3.1
Cobalt	7440-48-4	6.3	mg/kg	0.11	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	B	6.7
Cobalt	7440-48-4	6.7	mg/kg	0.1	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		6.3
Cobalt	7440-48-4	8.9	mg/kg	0.12		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		7.4
Cobalt	7440-48-4	5.9	mg/kg	0.048		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		2.9
Cobalt	7440-48-4	7.4	mg/kg	0.11		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		6.5
Cobalt	7440-48-4	5.8	mg/kg	0.051		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		3.1
Cobalt	7440-48-4	4.5	mg/kg	0.065		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		3.9
Cobalt	7440-48-4	6.3	mg/kg	0.082		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		5
Cobalt	7440-48-4	5	mg/kg	0.077		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		4.6
Cobalt	7440-48-4	7.7	mg/kg	0.053		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		3.2
Cobalt	7440-48-4	7.85	mg/kg	0.12		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		7.2
Cobalt	7440-48-4	12.2	mg/kg	0.049		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		3
Cobalt	7440-48-4	8.5	mg/kg	0.05		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		3
Copper	7440-50-8	124	mg/kg	0.15		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		1.8
Copper	7440-50-8	18.4	mg/kg	0.13		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		1.6
Copper	7440-50-8	11.6	mg/kg	0.13		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		1.6

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Copper	7440-50-8	16.2	mg/kg	0.28		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		3.4
Copper	7440-50-8	14.2	mg/kg	0.26		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		3.2
Copper	7440-50-8	43.6	mg/kg	0.31		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		3.7
Copper	7440-50-8	15	mg/kg	0.12		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		1.5
Copper	7440-50-8	19.3	mg/kg	0.27		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		3.2
Copper	7440-50-8	17.5	mg/kg	0.13		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		1.5
Copper	7440-50-8	21.6	mg/kg	0.16		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		1.9
Copper	7440-50-8	26.5	mg/kg	0.21		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		2.5
Copper	7440-50-8	38.9	mg/kg	0.19		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		2.3
Copper	7440-50-8	20.55	mg/kg	0.13		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		1.6
Copper	7440-50-8	24.05	mg/kg	0.305		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		3.65
Copper	7440-50-8	20.9	mg/kg	0.12		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		1.5
Copper	7440-50-8	17.6	mg/kg	0.13		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		1.5
Dibenz(a,h)anthracene	53-70-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dibenz(a,h)anthracene	53-70-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dibenz(a,h)anthracene	53-70-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dibenz(a,h)anthracene	53-70-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dibenz(a,h)anthracene	53-70-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dibenz(a,h)anthracene	53-70-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dibenz(a,h)anthracene	53-70-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dibenz(a,h)anthracene	53-70-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dibenz(a,h)anthracene	53-70-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dibenz(a,h)anthracene	53-70-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dibenz(a,h)anthracene	53-70-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dibenz(a,h)anthracene	53-70-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dibenzofuran	132-64-9	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dibenzofuran	132-64-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dibenzofuran	132-64-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dibenzofuran	132-64-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dibenzofuran	132-64-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dibenzofuran	132-64-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dibenzofuran	132-64-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dibenzofuran	132-64-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dibenzofuran	132-64-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dibenzofuran	132-64-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dibenzofuran	132-64-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dibenzofuran	132-64-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dibenzofuran	132-64-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dibenzofuran	132-64-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dibenzofuran	132-64-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dibenzofuran	132-64-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dichlorobenzene, 1,2-	95-50-1	0.125	mg/kg	0.064	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dichlorobenzene, 1,2-	95-50-1	0.1	mg/kg	0.053	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dichlorobenzene, 1,2-	95-50-1	0.105	mg/kg	0.056	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dichlorobenzene, 1,2-	95-50-1	0.23	mg/kg	0.12	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.11	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.245	mg/kg	0.13	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dichlorobenzene, 1,2-	95-50-1	0.1	mg/kg	0.053	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dichlorobenzene, 1,2-	95-50-1	0.215	mg/kg	0.11	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dichlorobenzene, 1,2-	95-50-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dichlorobenzene, 1,2-	95-50-1	0.13	mg/kg	0.068	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dichlorobenzene, 1,2-	95-50-1	0.17	mg/kg	0.088	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dichlorobenzene, 1,2-	95-50-1	0.155	mg/kg	0.081	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dichlorobenzene, 1,2-	95-50-1	0.1075	mg/kg	0.0555	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dichlorobenzene, 1,2-	95-50-1	0.2475	mg/kg	0.125	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dichlorobenzene, 1,2-	95-50-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dichlorobenzene, 1,2-	95-50-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dichlorobenzene, 1,3-	541-73-1	0.125	mg/kg	0.064	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dichlorobenzene, 1,3-	541-73-1	0.1	mg/kg	0.053	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dichlorobenzene, 1,3-	541-73-1	0.105	mg/kg	0.056	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dichlorobenzene, 1,3-	541-73-1	0.23	mg/kg	0.12	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.11	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.245	mg/kg	0.13	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dichlorobenzene, 1,3-	541-73-1	0.1	mg/kg	0.053	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dichlorobenzene, 1,3-	541-73-1	0.215	mg/kg	0.11	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dichlorobenzene, 1,3-	541-73-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dichlorobenzene, 1,3-	541-73-1	0.13	mg/kg	0.068	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dichlorobenzene, 1,3-	541-73-1	0.17	mg/kg	0.088	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dichlorobenzene, 1,3-	541-73-1	0.155	mg/kg	0.081	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dichlorobenzene, 1,3-	541-73-1	0.1075	mg/kg	0.0555	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dichlorobenzene, 1,3-	541-73-1	0.2475	mg/kg	0.125	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dichlorobenzene, 1,3-	541-73-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dichlorobenzene, 1,3-	541-73-1	0.105	mg/kg	0.054	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dichlorobenzene, 1,4-	106-46-7	0.125	mg/kg	0.059	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dichlorobenzene, 1,4-	106-46-7	0.1	mg/kg	0.049	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dichlorobenzene, 1,4-	106-46-7	0.105	mg/kg	0.051	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dichlorobenzene, 1,4-	106-46-7	0.23	mg/kg	0.11	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.1	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.245	mg/kg	0.12	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dichlorobenzene, 1,4-	106-46-7	0.1	mg/kg	0.049	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dichlorobenzene, 1,4-	106-46-7	0.215	mg/kg	0.1	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dichlorobenzene, 1,4-	106-46-7	0.105	mg/kg	0.05	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dichlorobenzene, 1,4-	106-46-7	0.13	mg/kg	0.063	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dichlorobenzene, 1,4-	106-46-7	0.17	mg/kg	0.081	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dichlorobenzene, 1,4-	106-46-7	0.155	mg/kg	0.075	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dichlorobenzene, 1,4-	106-46-7	0.1075	mg/kg	0.051	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dichlorobenzene, 1,4-	106-46-7	0.2475	mg/kg	0.12	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dichlorobenzene, 1,4-	106-46-7	0.105	mg/kg	0.05	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dichlorobenzene, 1,4-	106-46-7	0.105	mg/kg	0.05	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dichlorobenzidine, 3,3'-	91-94-1	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Dichlorobenzidine, 3,3'-	91-94-1	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Dichlorobenzidine, 3,3'-	91-94-1	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Dichlorobenzidine, 3,3'-	91-94-1	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Dichlorobenzidine, 3,3'-	91-94-1	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Dichlorobenzidine, 3,3'-	91-94-1	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Dichlorobenzidine, 3,3'-	91-94-1	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Dichlorobenzidine, 3,3'-	91-94-1	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Dichlorobenzidine, 3,3'-	91-94-1	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Dichlorobenzidine, 3,3'-	91-94-1	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Dichlorobenzidine, 3,3'-	91-94-1	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Dichlorobenzidine, 3,3'-	91-94-1	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Dichlorobenzidine, 3,3'-	91-94-1	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Dichlorobenzidine, 3,3'-	91-94-1	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.99
Dichlorobenzidine, 3,3'-	91-94-1	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Dichlorobenzidine, 3,3'-	91-94-1	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Dichlorophenol, 2,4-	120-83-2	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dichlorophenol, 2,4-	120-83-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dichlorophenol, 2,4-	120-83-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dichlorophenol, 2,4-	120-83-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dichlorophenol, 2,4-	120-83-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dichlorophenol, 2,4-	120-83-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dichlorophenol, 2,4-	120-83-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dichlorophenol, 2,4-	120-83-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dichlorophenol, 2,4-	120-83-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dichlorophenol, 2,4-	120-83-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dichlorophenol, 2,4-	120-83-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dichlorophenol, 2,4-	120-83-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dichlorophenol, 2,4-	120-83-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dichlorophenol, 2,4-	120-83-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Diethyl phthalate	84-66-2	0.245	mg/kg	0.25	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Diethyl phthalate	84-66-2	0.205	mg/kg	0.2	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Diethyl phthalate	84-66-2	0.215	mg/kg	0.21	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Diethyl phthalate	84-66-2	0.46	mg/kg	0.46	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Diethyl phthalate	84-66-2	0.425	mg/kg	0.43	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Diethyl phthalate	84-66-2	0.495	mg/kg	0.49	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Diethyl phthalate	84-66-2	0.205	mg/kg	0.2	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Diethyl phthalate	84-66-2	0.435	mg/kg	0.43	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Diethyl phthalate	84-66-2	0.21	mg/kg	0.21	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Diethyl phthalate	84-66-2	0.26	mg/kg	0.26	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Diethyl phthalate	84-66-2	0.34	mg/kg	0.34	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Diethyl phthalate	84-66-2	0.315	mg/kg	0.31	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Diethyl phthalate	84-66-2	0.2125	mg/kg	0.215	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Diethyl phthalate	84-66-2	0.495	mg/kg	0.495	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.99
Diethyl phthalate	84-66-2	0.21	mg/kg	0.21	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Diethyl phthalate	84-66-2	0.21	mg/kg	0.21	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Dimethyl phthalate	131-11-3	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Dimethyl phthalate	131-11-3	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Dimethyl phthalate	131-11-3	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Dimethyl phthalate	131-11-3	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Dimethyl phthalate	131-11-3	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Dimethyl phthalate	131-11-3	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Dimethyl phthalate	131-11-3	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Dimethyl phthalate	131-11-3	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Dimethyl phthalate	131-11-3	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dimethyl phthalate	131-11-3	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Dimethyl phthalate	131-11-3	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Dimethyl phthalate	131-11-3	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Dimethyl phthalate	131-11-3	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Dimethyl phthalate	131-11-3	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.99
Dimethyl phthalate	131-11-3	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Dimethyl phthalate	131-11-3	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Dimethylphenol, 2,4-	105-67-9	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dimethylphenol, 2,4-	105-67-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dimethylphenol, 2,4-	105-67-9	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dimethylphenol, 2,4-	105-67-9	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dimethylphenol, 2,4-	105-67-9	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dimethylphenol, 2,4-	105-67-9	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dimethylphenol, 2,4-	105-67-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dimethylphenol, 2,4-	105-67-9	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dimethylphenol, 2,4-	105-67-9	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dimethylphenol, 2,4-	105-67-9	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dimethylphenol, 2,4-	105-67-9	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dimethylphenol, 2,4-	105-67-9	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	40046	0.3	1	UU	0.495
Dimethylphenol, 2,4-	105-67-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dimethylphenol, 2,4-	105-67-9	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Di-n-butyl phthalate	84-74-2	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Di-n-butyl phthalate	84-74-2	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Di-n-butyl phthalate	84-74-2	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Di-n-butyl phthalate	84-74-2	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Di-n-butyl phthalate	84-74-2	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Di-n-butyl phthalate	84-74-2	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Di-n-butyl phthalate	84-74-2	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Di-n-butyl phthalate	84-74-2	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Di-n-butyl phthalate	84-74-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Di-n-butyl phthalate	84-74-2	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Di-n-butyl phthalate	84-74-2	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Di-n-butyl phthalate	84-74-2	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Di-n-butyl phthalate	84-74-2	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Di-n-butyl phthalate	84-74-2	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Di-n-butyl phthalate	84-74-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Di-n-butyl phthalate	84-74-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Dinitro-2-methylphenol, 4,6-	534-52-1	0.245	mg/kg	0.16	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Dinitro-2-methylphenol, 4,6-	534-52-1	0.205	mg/kg	0.13	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Dinitro-2-methylphenol, 4,6-	534-52-1	0.215	mg/kg	0.14	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Dinitro-2-methylphenol, 4,6-	534-52-1	0.46	mg/kg	0.29	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Dinitro-2-methylphenol, 4,6-	534-52-1	0.425	mg/kg	0.27	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Dinitro-2-methylphenol, 4,6-	534-52-1	0.495	mg/kg	0.32	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Dinitro-2-methylphenol, 4,6-	534-52-1	0.205	mg/kg	0.13	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Dinitro-2-methylphenol, 4,6-	534-52-1	0.435	mg/kg	0.28	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Dinitro-2-methylphenol, 4,6-	534-52-1	0.21	mg/kg	0.13	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Dinitro-2-methylphenol, 4,6-	534-52-1	0.26	mg/kg	0.17	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Dinitro-2-methylphenol, 4,6-	534-52-1	0.34	mg/kg	0.22	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Dinitro-2-methylphenol, 4,6-	534-52-1	0.315	mg/kg	0.2	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Dinitro-2-methylphenol, 4,6-	534-52-1	0.2125	mg/kg	0.135	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Dinitro-2-methylphenol, 4,6-	534-52-1	0.495	mg/kg	0.315	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Dinitro-2-methylphenol, 4,6-	534-52-1	0.21	mg/kg	0.13	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Dinitro-2-methylphenol, 4,6-	534-52-1	0.21	mg/kg	0.13	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.048	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Dinitrobenzene, 1,3-	99-65-0	0.075	mg/kg	0.04	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.042	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.047	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.05	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Dinitrobenzene, 1,3-	99-65-0	0.085	mg/kg	0.046	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.042	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.048	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.046	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.042	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.075	mg/kg	0.041	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Dinitrobenzene, 1,3-	99-65-0	0.095	mg/kg	0.051	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.043	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Dinitrobenzene, 1,3-	99-65-0	0.085	mg/kg	0.0455	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Dinitrobenzene, 1,3-	99-65-0	0.07	mg/kg	0.038	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.043	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Dinitrophenol, 2,4-	51-28-5	0.6	mg/kg	0.49	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.2
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	0.41	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	1
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	0.43	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.1
Dinitrophenol, 2,4-	51-28-5	1.15	mg/kg	0.92	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	2.3

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dinitrophenol, 2,4-	51-28-5	1.05	mg/kg	0.85	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	2.1
Dinitrophenol, 2,4-	51-28-5	1.25	mg/kg	0.99	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	2.5
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	0.41	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	1
Dinitrophenol, 2,4-	51-28-5	1.1	mg/kg	0.87	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	2.2
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	1
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	0.52	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	1.3
Dinitrophenol, 2,4-	51-28-5	0.85	mg/kg	0.68	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	1.7
Dinitrophenol, 2,4-	51-28-5	0.8	mg/kg	0.63	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	1.6
Dinitrophenol, 2,4-	51-28-5	0.55	mg/kg	0.425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	1.1
Dinitrophenol, 2,4-	51-28-5	1.25	mg/kg	0.99	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	2.5
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	1
Dinitrophenol, 2,4-	51-28-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	1
Dinitrotoluene, 2,4- exp	121-14-2	0.09	mg/kg	0.054	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Dinitrotoluene, 2,4- exp	121-14-2	0.075	mg/kg	0.046	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Dinitrotoluene, 2,4- exp	121-14-2	0.08	mg/kg	0.048	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Dinitrotoluene, 2,4- exp	121-14-2	0.09	mg/kg	0.053	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Dinitrotoluene, 2,4- exp	121-14-2	0.095	mg/kg	0.057	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Dinitrotoluene, 2,4- exp	121-14-2	0.085	mg/kg	0.052	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Dinitrotoluene, 2,4- exp	121-14-2	0.08	mg/kg	0.047	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Dinitrotoluene, 2,4- exp	121-14-2	0.09	mg/kg	0.054	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Dinitrotoluene, 2,4- exp	121-14-2	0.09	mg/kg	0.053	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Dinitrotoluene, 2,4- exp	121-14-2	0.08	mg/kg	0.048	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Dinitrotoluene, 2,4- exp	121-14-2	0.075	mg/kg	0.046	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Dinitrotoluene, 2,4- exp	121-14-2	0.095	mg/kg	0.058	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Dinitrotoluene, 2,4- exp	121-14-2	0.08	mg/kg	0.0485	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Dinitrotoluene, 2,4- exp	121-14-2	0.085	mg/kg	0.051	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Dinitrotoluene, 2,4- exp	121-14-2	0.07	mg/kg	0.043	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Dinitrotoluene, 2,4- exp	121-14-2	0.08	mg/kg	0.048	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Dinitrotoluene, 2,4- svoc	121-14-2	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dinitrotoluene, 2,4- svoc	121-14-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dinitrotoluene, 2,4- svoc	121-14-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dinitrotoluene, 2,4- svoc	121-14-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dinitrotoluene, 2,4- svoc	121-14-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dinitrotoluene, 2,4- svoc	121-14-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dinitrotoluene, 2,4- svoc	121-14-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dinitrotoluene, 2,4- svoc	121-14-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dinitrotoluene, 2,4- svoc	121-14-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dinitrotoluene, 2,4- svoc	121-14-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dinitrotoluene, 2,4- svoc	121-14-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dinitrotoluene, 2,4- svoc	121-14-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dinitrotoluene, 2,4- svoc	121-14-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dinitrotoluene, 2,4- svoc	121-14-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Dinitrotoluene, 2,4- svoc	121-14-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Dinitrotoluene, 2,4- svoc	121-14-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Dinitrotoluene, 2,6- exp	606-20-2	0.0563	mg/kg	0.048	J	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	J	0.18
Dinitrotoluene, 2,6- exp	606-20-2	0.075	mg/kg	0.04	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Dinitrotoluene, 2,6- exp	606-20-2	0.08	mg/kg	0.042	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Dinitrotoluene, 2,6- exp	606-20-2	0.0512	mg/kg	0.047	J	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	J	0.18
Dinitrotoluene, 2,6- exp	606-20-2	0.095	mg/kg	0.05	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Dinitrotoluene, 2,6- exp	606-20-2	0.085	mg/kg	0.046	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Dinitrotoluene, 2,6- exp	606-20-2	0.08	mg/kg	0.042	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Dinitrotoluene, 2,6- exp	606-20-2	0.0562	mg/kg	0.048	J	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	J	0.18
Dinitrotoluene, 2,6- exp	606-20-2	0.09	mg/kg	0.046	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Dinitrotoluene, 2,6- exp	606-20-2	0.08	mg/kg	0.042	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Dinitrotoluene, 2,6- exp	606-20-2	0.075	mg/kg	0.041	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Dinitrotoluene, 2,6- exp	606-20-2	0.095	mg/kg	0.051	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Dinitrotoluene, 2,6- exp	606-20-2	0.08	mg/kg	0.043	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Dinitrotoluene, 2,6- exp	606-20-2	0.06615	mg/kg	0.0455	JJ	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	JJ	0.17
Dinitrotoluene, 2,6- exp	606-20-2	0.07	mg/kg	0.038	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Dinitrotoluene, 2,6- exp	606-20-2	0.08	mg/kg	0.043	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Dinitrotoluene, 2,6- svoc	606-20-2	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Dinitrotoluene, 2,6- svoc	606-20-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Dinitrotoluene, 2,6- svoc	606-20-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Dinitrotoluene, 2,6- svoc	606-20-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Dinitrotoluene, 2,6- svoc	606-20-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Dinitrotoluene, 2,6- svoc	606-20-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Dinitrotoluene, 2,6- svoc	606-20-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Dinitrotoluene, 2,6- svoc	606-20-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Dinitrotoluene, 2,6- svoc	606-20-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Dinitrotoluene, 2,6- svoc	606-20-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Dinitrotoluene, 2,6- svoc	606-20-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Dinitrotoluene, 2,6- svoc	606-20-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Dinitrotoluene, 2,6- svoc	606-20-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Dinitrotoluene, 2,6- svoc	606-20-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Dinitrotoluene, 2,6- svoc	606-20-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dinitrotoluene, 2,6- svoc	606-20-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Di-n-octyl phthalate	117-84-0	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Di-n-octyl phthalate	117-84-0	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Di-n-octyl phthalate	117-84-0	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Di-n-octyl phthalate	117-84-0	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Di-n-octyl phthalate	117-84-0	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Di-n-octyl phthalate	117-84-0	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Di-n-octyl phthalate	117-84-0	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Di-n-octyl phthalate	117-84-0	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Di-n-octyl phthalate	117-84-0	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Di-n-octyl phthalate	117-84-0	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Di-n-octyl phthalate	117-84-0	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Di-n-octyl phthalate	117-84-0	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Di-n-octyl phthalate	117-84-0	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Di-n-octyl phthalate	117-84-0	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Di-n-octyl phthalate	117-84-0	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Di-n-octyl phthalate	117-84-0	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Fluoranthene	206-44-0	0.401	mg/kg	0.049		ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1		0.25
Fluoranthene	206-44-0	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Fluoranthene	206-44-0	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Fluoranthene	206-44-0	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Fluoranthene	206-44-0	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Fluoranthene	206-44-0	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Fluoranthene	206-44-0	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Fluoranthene	206-44-0	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Fluoranthene	206-44-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Fluoranthene	206-44-0	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Fluoranthene	206-44-0	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Fluoranthene	206-44-0	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Fluoranthene	206-44-0	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Fluoranthene	206-44-0	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Fluoranthene	206-44-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Fluoranthene	206-44-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Fluorene	86-73-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Fluorene	86-73-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Fluorene	86-73-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Fluorene	86-73-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Fluorene	86-73-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Fluorene	86-73-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Fluorene	86-73-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Fluorene	86-73-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Fluorene	86-73-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Fluorene	86-73-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Fluorene	86-73-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Fluorene	86-73-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Fluorene	86-73-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Fluorene	86-73-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Fluorene	86-73-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Fluorene	86-73-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Hexachlorobenzene	118-74-1	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Hexachlorobenzene	118-74-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Hexachlorobenzene	118-74-1	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Hexachlorobenzene	118-74-1	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Hexachlorobenzene	118-74-1	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Hexachlorobenzene	118-74-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Hexachlorobenzene	118-74-1	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Hexachlorobenzene	118-74-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Hexachlorobenzene	118-74-1	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Hexachlorobenzene	118-74-1	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Hexachlorobenzene	118-74-1	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Hexachlorobenzene	118-74-1	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Hexachlorobenzene	118-74-1	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Hexachlorobenzene	118-74-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Hexachlorobenzene	118-74-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Hexachlorobutadiene	87-68-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Hexachlorobutadiene	87-68-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Hexachlorobutadiene	87-68-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Hexachlorobutadiene	87-68-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Hexachlorobutadiene	87-68-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Hexachlorobutadiene	87-68-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Hexachlorobutadiene	87-68-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Hexachlorobutadiene	87-68-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Hexachlorobutadiene	87-68-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Hexachlorobutadiene	87-68-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Hexachlorobutadiene	87-68-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Hexachlorobutadiene	87-68-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Hexachlorobutadiene	87-68-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Hexachlorobutadiene	87-68-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Hexachlorobutadiene	87-68-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Hexachlorocyclopentadiene	77-47-4	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Hexachlorocyclopentadiene	77-47-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Hexachlorocyclopentadiene	77-47-4	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Hexachlorocyclopentadiene	77-47-4	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Hexachlorocyclopentadiene	77-47-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Hexachlorocyclopentadiene	77-47-4	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Hexachlorocyclopentadiene	77-47-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Hexachlorocyclopentadiene	77-47-4	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Hexachlorocyclopentadiene	77-47-4	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Hexachlorocyclopentadiene	77-47-4	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Hexachlorocyclopentadiene	77-47-4	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Hexachlorocyclopentadiene	77-47-4	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Hexachlorocyclopentadiene	77-47-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Hexachlorocyclopentadiene	77-47-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Hexachloroethane	67-72-1	0.125	mg/kg	0.059	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Hexachloroethane	67-72-1	0.1	mg/kg	0.049	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Hexachloroethane	67-72-1	0.105	mg/kg	0.051	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Hexachloroethane	67-72-1	0.23	mg/kg	0.11	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Hexachloroethane	67-72-1	0.215	mg/kg	0.1	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Hexachloroethane	67-72-1	0.245	mg/kg	0.12	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Hexachloroethane	67-72-1	0.1	mg/kg	0.049	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Hexachloroethane	67-72-1	0.215	mg/kg	0.1	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Hexachloroethane	67-72-1	0.105	mg/kg	0.05	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Hexachloroethane	67-72-1	0.13	mg/kg	0.063	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Hexachloroethane	67-72-1	0.17	mg/kg	0.081	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Hexachloroethane	67-72-1	0.155	mg/kg	0.075	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Hexachloroethane	67-72-1	0.1075	mg/kg	0.051	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Hexachloroethane	67-72-1	0.2475	mg/kg	0.12	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Hexachloroethane	67-72-1	0.105	mg/kg	0.05	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Hexachloroethane	67-72-1	0.105	mg/kg	0.05	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
HMX	2691-41-0	0.09	mg/kg	0.077	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
HMX	2691-41-0	0.075	mg/kg	0.066	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
HMX	2691-41-0	0.08	mg/kg	0.069	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
HMX	2691-41-0	0.09	mg/kg	0.076	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
HMX	2691-41-0	0.095	mg/kg	0.082	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
HMX	2691-41-0	0.085	mg/kg	0.075	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
HMX	2691-41-0	0.08	mg/kg	0.068	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
HMX	2691-41-0	0.09	mg/kg	0.077	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
HMX	2691-41-0	0.09	mg/kg	0.075	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
HMX	2691-41-0	0.08	mg/kg	0.068	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
HMX	2691-41-0	0.075	mg/kg	0.066	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
HMX	2691-41-0	0.095	mg/kg	0.083	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
HMX	2691-41-0	0.08	mg/kg	0.0695	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
HMX	2691-41-0	0.085	mg/kg	0.0735	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
HMX	2691-41-0	0.07	mg/kg	0.062	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
HMX	2691-41-0	0.08	mg/kg	0.069	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Indeno(1,2,3-cd)pyrene	193-39-5	0.0914	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Indeno(1,2,3-cd)pyrene	193-39-5	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Indeno(1,2,3-cd)pyrene	193-39-5	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Indeno(1,2,3-cd)pyrene	193-39-5	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Indeno(1,2,3-cd)pyrene	193-39-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Indeno(1,2,3-cd)pyrene	193-39-5	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Indeno(1,2,3-cd)pyrene	193-39-5	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Indeno(1,2,3-cd)pyrene	193-39-5	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Indeno(1,2,3-cd)pyrene	193-39-5	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Indeno(1,2,3-cd)pyrene	193-39-5	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Indeno(1,2,3-cd)pyrene	193-39-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Indeno(1,2,3-cd)pyrene	193-39-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Iron	7439-89-6	12400	mg/kg	1.7	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		7.2
Iron	7439-89-6	14500	mg/kg	1.4	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		6.2
Iron	7439-89-6	13300	mg/kg	1.4	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		6.3
Iron	7439-89-6	24700	mg/kg	3.1	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		13
Iron	7439-89-6	20100	mg/kg	2.9	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		13

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Iron	7439-89-6	24000	mg/kg	3.4		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		15
Iron	7439-89-6	11200	mg/kg	1.3		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		5.8
Iron	7439-89-6	22800	mg/kg	3		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		13
Iron	7439-89-6	16700	mg/kg	1.4		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		6.2
Iron	7439-89-6	68300	mg/kg	3.6		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		16
Iron	7439-89-6	67800	mg/kg	4.6		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		20
Iron	7439-89-6	15200	mg/kg	2.1		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		9.2
Iron	7439-89-6	16300	mg/kg	1.5		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		6.3
Iron	7439-89-6	39300	mg/kg	3.3		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1		14.5
Iron	7439-89-6	28300	mg/kg	1.4		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		5.9
Iron	7439-89-6	20500	mg/kg	1.4		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		6.1
Isophorone	78-59-1	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Isophorone	78-59-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Isophorone	78-59-1	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Isophorone	78-59-1	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Isophorone	78-59-1	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Isophorone	78-59-1	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Isophorone	78-59-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Isophorone	78-59-1	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Isophorone	78-59-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Isophorone	78-59-1	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Isophorone	78-59-1	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Isophorone	78-59-1	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Isophorone	78-59-1	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Isophorone	78-59-1	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Isophorone	78-59-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Isophorone	78-59-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Lead	7439-92-1	16.5	mg/kg	0.14		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		7.2
Lead	7439-92-1	9.3	mg/kg	0.25	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	B	12
Lead	7439-92-1	9.7	mg/kg	0.13		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		6.3
Lead	7439-92-1	3.4	mg/kg	0.27	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	B	13
Lead	7439-92-1	3.9	mg/kg	0.25	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	B	13
Lead	7439-92-1	20.4	mg/kg	0.29		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		15
Lead	7439-92-1	8.1	mg/kg	0.23	J	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	B	12
Lead	7439-92-1	12.5	mg/kg	0.26	J	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	B	13
Lead	7439-92-1	9.6	mg/kg	0.25	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	12
Lead	7439-92-1	4.5	mg/kg	0.31	J	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	B	16
Lead	7439-92-1	7	mg/kg	0.4	J	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	B	20
Lead	7439-92-1	12.2	mg/kg	0.18		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		9.2
Lead	7439-92-1	11.55	mg/kg	0.25	JJ	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BB	13
Lead	7439-92-1	8.25	mg/kg	0.285	JJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	BB	14.5
Lead	7439-92-1	8.6	mg/kg	0.12		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		5.9
Lead	7439-92-1	10	mg/kg	0.24	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	12
Magnesium	7439-95-4	2640	mg/kg	7.2	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		360
Magnesium	7439-95-4	16600	mg/kg	6.2	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		310
Magnesium	7439-95-4	5000	mg/kg	6.3	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		310
Magnesium	7439-95-4	891	mg/kg	13	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		670
Magnesium	7439-95-4	1210	mg/kg	13	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		630
Magnesium	7439-95-4	2300	mg/kg	15		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		740
Magnesium	7439-95-4	14900	mg/kg	5.8		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		290
Magnesium	7439-95-4	1120	mg/kg	13		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		650
Magnesium	7439-95-4	17500	mg/kg	6.2		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		310
Magnesium	7439-95-4	343	mg/kg	7.8	J	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	B	390
Magnesium	7439-95-4	610	mg/kg	9.9		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		500
Magnesium	7439-95-4	3130	mg/kg	9.2		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		460
Magnesium	7439-95-4	16650	mg/kg	6.3		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		320
Magnesium	7439-95-4	1850	mg/kg	14.5		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1		720
Magnesium	7439-95-4	12400	mg/kg	5.9		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		300
Magnesium	7439-95-4	15700	mg/kg	6.1		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		300
Manganese	7439-96-5	99.2	mg/kg	0.036	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		1.1
Manganese	7439-96-5	410	mg/kg	0.062	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		1.9
Manganese	7439-96-5	353	mg/kg	0.063	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		1.9
Manganese	7439-96-5	120	mg/kg	0.067	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		2
Manganese	7439-96-5	148	mg/kg	0.063	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		1.9
Manganese	7439-96-5	322	mg/kg	0.074		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		2.2
Manganese	7439-96-5	362	mg/kg	0.058		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		1.8
Manganese	7439-96-5	339	mg/kg	0.065		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		1.9
Manganese	7439-96-5	432	mg/kg	0.062		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		1.9
Manganese	7439-96-5	54.5	mg/kg	0.078		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		2.3
Manganese	7439-96-5	81.7	mg/kg	0.099		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		3
Manganese	7439-96-5	217	mg/kg	0.046		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		1.4
Manganese	7439-96-5	468.5	mg/kg	0.063		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		1.9
Manganese	7439-96-5	266.5	mg/kg	0.072		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1		2.15
Manganese	7439-96-5	1270	mg/kg	0.3		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		8.9
Manganese	7439-96-5	402	mg/kg	0.061		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		1.8

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Mercury	7439-97-6	0.15	mg/kg	0.017		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		0.12
Mercury	7439-97-6	0.015	mg/kg	0.013	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	B	0.091
Mercury	7439-97-6	0.047	mg/kg	0.016	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	B	0.11
Mercury	7439-97-6	0.11	mg/kg	0.032	U	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	U	0.22
Mercury	7439-97-6	0.036	mg/kg	0.031	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	B	0.21
Mercury	7439-97-6	0.13	mg/kg	0.035	J	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	B	0.24
Mercury	7439-97-6	0.014	mg/kg	0.013	J	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	B	0.09
Mercury	7439-97-6	0.11	mg/kg	0.032	U	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	U	0.22
Mercury	7439-97-6	0.03	mg/kg	0.015	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	0.1
Mercury	7439-97-6	0.065	mg/kg	0.019	U	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	U	0.13
Mercury	7439-97-6	0.037	mg/kg	0.023	J	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	B	0.16
Mercury	7439-97-6	0.066	mg/kg	0.02	J	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	B	0.14
Mercury	7439-97-6	0.024	mg/kg	0.015	JJ	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BB	0.105
Mercury	7439-97-6	0.075	mg/kg	0.033	JJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	BB	0.23
Mercury	7439-97-6	0.029	mg/kg	0.014	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	0.1
Mercury	7439-97-6	0.016	mg/kg	0.015	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	0.11
Methylnaphthalene, 2-	91-57-6	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Methylnaphthalene, 2-	91-57-6	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Methylnaphthalene, 2-	91-57-6	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Methylnaphthalene, 2-	91-57-6	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Methylnaphthalene, 2-	91-57-6	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Methylnaphthalene, 2-	91-57-6	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Methylnaphthalene, 2-	91-57-6	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Methylnaphthalene, 2-	91-57-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Methylnaphthalene, 2-	91-57-6	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Methylnaphthalene, 2-	91-57-6	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Methylnaphthalene, 2-	91-57-6	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Methylnaphthalene, 2-	91-57-6	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Methylnaphthalene, 2-	91-57-6	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Methylnaphthalene, 2-	91-57-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Methylnaphthalene, 2-	91-57-6	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Methylphenol, 2-	95-48-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Methylphenol, 2-	95-48-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Methylphenol, 2-	95-48-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Methylphenol, 2-	95-48-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Methylphenol, 2-	95-48-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Methylphenol, 2-	95-48-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Methylphenol, 2-	95-48-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Methylphenol, 2-	95-48-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Methylphenol, 2-	95-48-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Methylphenol, 2-	95-48-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Methylphenol, 2-	95-48-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Methylphenol, 2-	95-48-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Methylphenol, 2-	95-48-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Methylphenol, 2-	95-48-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Methylphenol, 2-	95-48-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Naphthalene	91-20-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Naphthalene	91-20-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Naphthalene	91-20-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Naphthalene	91-20-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Naphthalene	91-20-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Naphthalene	91-20-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Naphthalene	91-20-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Naphthalene	91-20-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Naphthalene	91-20-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Naphthalene	91-20-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Naphthalene	91-20-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Naphthalene	91-20-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Naphthalene	91-20-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Naphthalene	91-20-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Naphthalene	91-20-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Naphthalene	91-20-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Nickel	7440-02-0	13	mg/kg	0.17		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		2.9
Nickel	7440-02-0	17.1	mg/kg	0.14		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		2.5
Nickel	7440-02-0	13.6	mg/kg	0.14		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		2.5
Nickel	7440-02-0	13.4	mg/kg	0.31		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		5.4
Nickel	7440-02-0	15.1	mg/kg	0.29		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		5
Nickel	7440-02-0	22.9	mg/kg	0.34		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		5.9
Nickel	7440-02-0	14.3	mg/kg	0.13		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		2.3
Nickel	7440-02-0	17.2	mg/kg	0.3		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		5.2
Nickel	7440-02-0	16.4	mg/kg	0.14		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		2.5
Nickel	7440-02-0	11.5	mg/kg	0.18		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		3.1
Nickel	7440-02-0	16	mg/kg	0.23		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		4

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Nickel	7440-02-0	13.1	mg/kg	0.21		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		3.7
Nickel	7440-02-0	22.05	mg/kg	0.15		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		2.5
Nickel	7440-02-0	19.3	mg/kg	0.33		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1		5.8
Nickel	7440-02-0	31.9	mg/kg	0.14		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		2.4
Nickel	7440-02-0	18.8	mg/kg	0.14		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		2.4
Nitroaniline, 2-	88-74-4	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Nitroaniline, 2-	88-74-4	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Nitroaniline, 2-	88-74-4	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Nitroaniline, 2-	88-74-4	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Nitroaniline, 2-	88-74-4	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Nitroaniline, 2-	88-74-4	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Nitroaniline, 2-	88-74-4	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Nitroaniline, 2-	88-74-4	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Nitroaniline, 2-	88-74-4	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Nitroaniline, 2-	88-74-4	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Nitroaniline, 2-	88-74-4	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Nitroaniline, 2-	88-74-4	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Nitroaniline, 2-	88-74-4	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Nitroaniline, 2-	88-74-4	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Nitroaniline, 2-	88-74-4	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Nitroaniline, 2-	88-74-4	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Nitroaniline, 3-	99-09-2	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Nitroaniline, 3-	99-09-2	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Nitroaniline, 3-	99-09-2	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Nitroaniline, 3-	99-09-2	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Nitroaniline, 3-	99-09-2	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Nitroaniline, 3-	99-09-2	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Nitroaniline, 3-	99-09-2	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Nitroaniline, 3-	99-09-2	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Nitroaniline, 3-	99-09-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Nitroaniline, 3-	99-09-2	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Nitroaniline, 3-	99-09-2	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Nitroaniline, 3-	99-09-2	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Nitroaniline, 3-	99-09-2	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Nitroaniline, 3-	99-09-2	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Nitroaniline, 3-	99-09-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Nitroaniline, 3-	99-09-2	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Nitroaniline, 4-	100-01-6	0.245	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.49
Nitroaniline, 4-	100-01-6	0.205	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.41
Nitroaniline, 4-	100-01-6	0.215	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.43
Nitroaniline, 4-	100-01-6	0.46	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.92
Nitroaniline, 4-	100-01-6	0.425	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.85
Nitroaniline, 4-	100-01-6	0.495	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.99
Nitroaniline, 4-	100-01-6	0.205	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.41
Nitroaniline, 4-	100-01-6	0.435	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.87
Nitroaniline, 4-	100-01-6	0.21	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.42
Nitroaniline, 4-	100-01-6	0.26	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.52
Nitroaniline, 4-	100-01-6	0.34	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.68
Nitroaniline, 4-	100-01-6	0.315	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.63
Nitroaniline, 4-	100-01-6	0.2125	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.425
Nitroaniline, 4-	100-01-6	0.495	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.99
Nitroaniline, 4-	100-01-6	0.21	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.42
Nitroaniline, 4-	100-01-6	0.21	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.42
Nitrobenzene	98-95-3	0.09	mg/kg	0.059	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Nitrobenzene	98-95-3	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Nitrobenzene	98-95-3	0.075	mg/kg	0.05	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Nitrobenzene	98-95-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Nitrobenzene	98-95-3	0.08	mg/kg	0.053	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Nitrobenzene	98-95-3	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Nitrobenzene	98-95-3	0.09	mg/kg	0.058	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Nitrobenzene	98-95-3	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Nitrobenzene	98-95-3	0.095	mg/kg	0.063	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Nitrobenzene	98-95-3	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Nitrobenzene	98-95-3	0.085	mg/kg	0.058	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Nitrobenzene	98-95-3	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Nitrobenzene	98-95-3	0.08	mg/kg	0.052	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Nitrobenzene	98-95-3	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Nitrobenzene	98-95-3	0.09	mg/kg	0.059	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Nitrobenzene	98-95-3	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Nitrobenzene	98-95-3	0.09	mg/kg	0.058	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Nitrobenzene	98-95-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Nitrobenzene	98-95-3	0.08	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Nitrobenzene	98-95-3	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Nitrobenzene	98-95-3	0.075	mg/kg	0.051	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Nitrobenzene	98-95-3	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Nitrobenzene	98-95-3	0.095	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Nitrobenzene	98-95-3	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Nitrobenzene	98-95-3	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	3	5	UU	0.215
Nitrobenzene	98-95-3	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Nitrobenzene	98-95-3	0.07	mg/kg	0.048	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Nitrobenzene	98-95-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Nitrobenzene	98-95-3	0.08	mg/kg	0.053	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Nitrobenzene	98-95-3	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Nitrobenzene-exp	98-95-3	0.08	mg/kg	0.0535	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	3	5	UU	0.16
Nitrobenzene-exp	98-95-3	0.085	mg/kg	0.0565	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Nitrophenol, 2-	88-75-5	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Nitrophenol, 2-	88-75-5	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Nitrophenol, 2-	88-75-5	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Nitrophenol, 2-	88-75-5	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Nitrophenol, 2-	88-75-5	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Nitrophenol, 2-	88-75-5	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Nitrophenol, 2-	88-75-5	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Nitrophenol, 2-	88-75-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Nitrophenol, 2-	88-75-5	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Nitrophenol, 2-	88-75-5	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Nitrophenol, 2-	88-75-5	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Nitrophenol, 2-	88-75-5	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Nitrophenol, 2-	88-75-5	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Nitrophenol, 2-	88-75-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Nitrophenol, 2-	88-75-5	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Nitrophenol, 4-	100-02-7	0.6	mg/kg	0.49	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.2
Nitrophenol, 4-	100-02-7	0.5	mg/kg	0.41	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	1
Nitrophenol, 4-	100-02-7	0.55	mg/kg	0.43	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.1
Nitrophenol, 4-	100-02-7	1.15	mg/kg	0.92	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	2.3
Nitrophenol, 4-	100-02-7	1.05	mg/kg	0.85	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	2.1
Nitrophenol, 4-	100-02-7	1.25	mg/kg	0.99	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	2.5
Nitrophenol, 4-	100-02-7	0.5	mg/kg	0.41	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	1
Nitrophenol, 4-	100-02-7	1.1	mg/kg	0.87	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	2.2
Nitrophenol, 4-	100-02-7	0.5	mg/kg	0.42	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	1
Nitrophenol, 4-	100-02-7	0.65	mg/kg	0.52	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	1.3
Nitrophenol, 4-	100-02-7	0.85	mg/kg	0.68	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	1.7
Nitrophenol, 4-	100-02-7	0.8	mg/kg	0.63	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	1.6
Nitrophenol, 4-	100-02-7	0.55	mg/kg	0.425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	1.1
Nitrophenol, 4-	100-02-7	1.25	mg/kg	0.99	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	2.5
Nitrophenol, 4-	100-02-7	0.5	mg/kg	0.42	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	1
Nitrophenol, 4-	100-02-7	0.5	mg/kg	0.42	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	1
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.045	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Nitrotoluene, 2-	88-72-2	0.075	mg/kg	0.038	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.04	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.044	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.047	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Nitrotoluene, 2-	88-72-2	0.085	mg/kg	0.044	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.039	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.045	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.044	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Nitrotoluene, 2-	88-72-2	0.075	mg/kg	0.038	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Nitrotoluene, 2-	88-72-2	0.095	mg/kg	0.048	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.0405	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Nitrotoluene, 2-	88-72-2	0.085	mg/kg	0.0425	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Nitrotoluene, 2-	88-72-2	0.07	mg/kg	0.036	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.075	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Nitrotoluene, 3-	99-08-1	0.075	mg/kg	0.064	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.067	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.074	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.08	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Nitrotoluene, 3-	99-08-1	0.085	mg/kg	0.073	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.066	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.075	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.074	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.067	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Nitrotoluene, 3-	99-08-1	0.075	mg/kg	0.065	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Nitrotoluene, 3-	99-08-1	0.095	mg/kg	0.081	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.0685	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Nitrotoluene, 3-	99-08-1	0.085	mg/kg	0.0715	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Nitrotoluene, 3-	99-08-1	0.07	mg/kg	0.061	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.067	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.056	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Nitrotoluene, 4-	99-99-0	0.075	mg/kg	0.047	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.049	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.055	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.059	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Nitrotoluene, 4-	99-99-0	0.085	mg/kg	0.054	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.049	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.056	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.054	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.049	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Nitrotoluene, 4-	99-99-0	0.075	mg/kg	0.048	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Nitrotoluene, 4-	99-99-0	0.095	mg/kg	0.06	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.0505	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Nitrotoluene, 4-	99-99-0	0.085	mg/kg	0.053	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Nitrotoluene, 4-	99-99-0	0.07	mg/kg	0.045	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.05	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
n-Nitroso-di-n-propylamine	621-64-7	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
n-Nitroso-di-n-propylamine	621-64-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
n-Nitroso-di-n-propylamine	621-64-7	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
n-Nitroso-di-n-propylamine	621-64-7	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
n-Nitroso-di-n-propylamine	621-64-7	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
n-Nitroso-di-n-propylamine	621-64-7	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
n-Nitroso-di-n-propylamine	621-64-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
n-Nitroso-di-n-propylamine	621-64-7	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
n-Nitroso-di-n-propylamine	621-64-7	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
n-Nitroso-di-n-propylamine	621-64-7	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
n-Nitroso-di-n-propylamine	621-64-7	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
n-Nitroso-di-n-propylamine	621-64-7	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
n-Nitroso-di-n-propylamine	621-64-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
n-Nitroso-di-n-propylamine	621-64-7	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
n-Nitrosodiphenylamine	86-30-6	0.125	mg/kg	0.098	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
n-Nitrosodiphenylamine	86-30-6	0.1	mg/kg	0.082	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
n-Nitrosodiphenylamine	86-30-6	0.105	mg/kg	0.086	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
n-Nitrosodiphenylamine	86-30-6	0.23	mg/kg	0.18	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.17	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.245	mg/kg	0.2	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
n-Nitrosodiphenylamine	86-30-6	0.1	mg/kg	0.081	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
n-Nitrosodiphenylamine	86-30-6	0.215	mg/kg	0.17	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
n-Nitrosodiphenylamine	86-30-6	0.105	mg/kg	0.084	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
n-Nitrosodiphenylamine	86-30-6	0.13	mg/kg	0.1	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
n-Nitrosodiphenylamine	86-30-6	0.17	mg/kg	0.14	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
n-Nitrosodiphenylamine	86-30-6	0.155	mg/kg	0.13	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
n-Nitrosodiphenylamine	86-30-6	0.1075	mg/kg	0.085	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
n-Nitrosodiphenylamine	86-30-6	0.2475	mg/kg	0.2	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
n-Nitrosodiphenylamine	86-30-6	0.105	mg/kg	0.084	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
n-Nitrosodiphenylamine	86-30-6	0.105	mg/kg	0.084	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Pentachlorophenol	87-86-5	0.6	mg/kg	0.49	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.2
Pentachlorophenol	87-86-5	0.5	mg/kg	0.41	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	1
Pentachlorophenol	87-86-5	0.55	mg/kg	0.43	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	1.1
Pentachlorophenol	87-86-5	1.15	mg/kg	0.92	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	2.3
Pentachlorophenol	87-86-5	1.05	mg/kg	0.85	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	2.1
Pentachlorophenol	87-86-5	1.25	mg/kg	0.99	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	2.5
Pentachlorophenol	87-86-5	0.5	mg/kg	0.41	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	1
Pentachlorophenol	87-86-5	1.1	mg/kg	0.87	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	2.2
Pentachlorophenol	87-86-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	1
Pentachlorophenol	87-86-5	0.65	mg/kg	0.52	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	1.3
Pentachlorophenol	87-86-5	0.85	mg/kg	0.68	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	1.7
Pentachlorophenol	87-86-5	0.8	mg/kg	0.63	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	1.6
Pentachlorophenol	87-86-5	0.55	mg/kg	0.425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	1.1
Pentachlorophenol	87-86-5	1.25	mg/kg	0.99	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	2.5
Pentachlorophenol	87-86-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	1
Pentachlorophenol	87-86-5	0.5	mg/kg	0.42	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	1
Phenanthrene	85-01-8	0.107	mg/kg	0.049	J	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	J	0.25
Phenanthrene	85-01-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Phenanthrene	85-01-8	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Phenanthrene	85-01-8	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Phenanthrene	85-01-8	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Phenanthrene	85-01-8	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Phenanthrene	85-01-8	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Phenanthrene	85-01-8	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Phenanthrene	85-01-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Phenanthrene	85-01-8	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Phenanthrene	85-01-8	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Phenanthrene	85-01-8	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Phenanthrene	85-01-8	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Phenanthrene	85-01-8	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Phenanthrene	85-01-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Phenanthrene	85-01-8	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Phenol	108-95-2	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Phenol	108-95-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Phenol	108-95-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Phenol	108-95-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Phenol	108-95-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Phenol	108-95-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Phenol	108-95-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Phenol	108-95-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Phenol	108-95-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Phenol	108-95-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Phenol	108-95-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Phenol	108-95-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Phenol	108-95-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Phenol	108-95-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Phenol	108-95-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Phenol	108-95-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Potassium	7440-09-7	524	mg/kg	7.2	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	B	720
Potassium	7440-09-7	1970	mg/kg	6.2	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		620
Potassium	7440-09-7	818	mg/kg	6.3	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		630
Potassium	7440-09-7	1570	mg/kg	13	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		1300
Potassium	7440-09-7	1290	mg/kg	13	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	B	1300
Potassium	7440-09-7	1060	mg/kg	15	J	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	B	1500
Potassium	7440-09-7	1290	mg/kg	5.8		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		580
Potassium	7440-09-7	1110	mg/kg	13	J	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	B	1300
Potassium	7440-09-7	1490	mg/kg	6.2		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		620
Potassium	7440-09-7	923	mg/kg	7.8		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		780
Potassium	7440-09-7	1380	mg/kg	9.9		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		990
Potassium	7440-09-7	634	mg/kg	9.2	J	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	B	920
Potassium	7440-09-7	2110	mg/kg	6.3		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		630
Potassium	7440-09-7	1114	mg/kg	14.5	JJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	BB	1450
Potassium	7440-09-7	1400	mg/kg	5.9		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5		590
Potassium	7440-09-7	1900	mg/kg	6.1		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		610
Pyrene	129-00-0	0.273	mg/kg	0.049		ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1		0.25
Pyrene	129-00-0	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Pyrene	129-00-0	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Pyrene	129-00-0	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Pyrene	129-00-0	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Pyrene	129-00-0	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Pyrene	129-00-0	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Pyrene	129-00-0	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Pyrene	129-00-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Pyrene	129-00-0	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Pyrene	129-00-0	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Pyrene	129-00-0	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Pyrene	129-00-0	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Pyrene	129-00-0	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Pyrene	129-00-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Pyrene	129-00-0	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
RDX	121-82-4	0.09	mg/kg	0.076	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
RDX	121-82-4	0.075	mg/kg	0.065	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
RDX	121-82-4	0.08	mg/kg	0.068	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
RDX	121-82-4	0.09	mg/kg	0.075	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
RDX	121-82-4	0.095	mg/kg	0.081	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
RDX	121-82-4	0.085	mg/kg	0.074	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
RDX	121-82-4	0.08	mg/kg	0.067	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
RDX	121-82-4	0.09	mg/kg	0.076	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
RDX	121-82-4	0.09	mg/kg	0.075	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
RDX	121-82-4	0.08	mg/kg	0.067	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
RDX	121-82-4	0.075	mg/kg	0.065	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
RDX	121-82-4	0.095	mg/kg	0.082	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
RDX	121-82-4	0.08	mg/kg	0.069	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
RDX	121-82-4	0.085	mg/kg	0.0725	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
RDX	121-82-4	0.07	mg/kg	0.061	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
RDX	121-82-4	0.08	mg/kg	0.068	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Selenium	7782-49-2	1.1	mg/kg	0.22	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	B	7.2
Selenium	7782-49-2	0.84	mg/kg	0.38	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	B	12
Selenium	7782-49-2	0.59	mg/kg	0.19	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	B	6.3
Selenium	7782-49-2	2.2	mg/kg	0.42	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	B	13
Selenium	7782-49-2	1.9	mg/kg	0.39	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	B	13
Selenium	7782-49-2	2.9	mg/kg	0.46	J	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	B	15
Selenium	7782-49-2	1.1	mg/kg	0.36	J	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	B	12

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Selenium	7782-49-2	1.7	mg/kg	0.4	J	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	B	13
Selenium	7782-49-2	1.1	mg/kg	0.38	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	12
Selenium	7782-49-2	1.4	mg/kg	0.48	J	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	B	16
Selenium	7782-49-2	1.5	mg/kg	0.61	J	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	B	20
Selenium	7782-49-2	1.6	mg/kg	0.29	J	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	B	9.2
Selenium	7782-49-2	0.94	mg/kg	0.39	JJ	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BB	13
Selenium	7782-49-2	2.75	mg/kg	0.445	JJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	BB	14.5
Selenium	7782-49-2	0.66	mg/kg	0.18	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	5.9
Selenium	7782-49-2	2.1	mg/kg	0.38	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	12
Silver	7440-22-4	0.36	mg/kg	0.087	UJ	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	U	0.72
Silver	7440-22-4	0.31	mg/kg	0.074	UJ	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	U	0.62
Silver	7440-22-4	0.315	mg/kg	0.075	U	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	U	0.63
Silver	7440-22-4	0.65	mg/kg	0.16	UJ	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	U	1.3
Silver	7440-22-4	0.65	mg/kg	0.15	UJ	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	U	1.3
Silver	7440-22-4	0.75	mg/kg	0.18	U	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	U	1.5
Silver	7440-22-4	0.29	mg/kg	0.07	U	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	U	0.58
Silver	7440-22-4	0.65	mg/kg	0.16	U	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	U	1.3
Silver	7440-22-4	0.31	mg/kg	0.074	U	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	U	0.62
Silver	7440-22-4	0.39	mg/kg	0.093	U	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	U	0.78
Silver	7440-22-4	0.495	mg/kg	0.12	U	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	U	0.99
Silver	7440-22-4	0.46	mg/kg	0.11	U	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	U	0.92
Silver	7440-22-4	0.315	mg/kg	0.076	UU	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	UU	0.63
Silver	7440-22-4	0.725	mg/kg	0.17	UU	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	UU	1.45
Silver	7440-22-4	0.295	mg/kg	0.071	U	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	U	0.59
Silver	7440-22-4	0.305	mg/kg	0.073	U	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	U	0.61
Sodium	7440-23-5	238	mg/kg	36	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	B	720
Sodium	7440-23-5	293	mg/kg	31	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	B	620
Sodium	7440-23-5	196	mg/kg	31	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	B	630
Sodium	7440-23-5	640	mg/kg	67	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	B	1300
Sodium	7440-23-5	570	mg/kg	63	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	B	1300
Sodium	7440-23-5	510	mg/kg	74	J	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	B	1500
Sodium	7440-23-5	224	mg/kg	29	J	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	B	580
Sodium	7440-23-5	531	mg/kg	65	J	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	B	1300
Sodium	7440-23-5	261	mg/kg	31	J	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	B	620
Sodium	7440-23-5	493	mg/kg	39	J	ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1	B	780
Sodium	7440-23-5	634	mg/kg	50	J	ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2	B	990
Sodium	7440-23-5	168	mg/kg	46	J	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	B	920
Sodium	7440-23-5	274.5	mg/kg	32	JJ	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	BB	630
Sodium	7440-23-5	564	mg/kg	72	JJ	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	BB	1450
Sodium	7440-23-5	324	mg/kg	30	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	590
Sodium	7440-23-5	300	mg/kg	30	J	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	B	610
Tetryl	479-45-8	0.09	mg/kg	0.046	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Tetryl	479-45-8	0.075	mg/kg	0.039	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Tetryl	479-45-8	0.08	mg/kg	0.041	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Tetryl	479-45-8	0.09	mg/kg	0.045	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Tetryl	479-45-8	0.095	mg/kg	0.048	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Tetryl	479-45-8	0.085	mg/kg	0.045	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Tetryl	479-45-8	0.08	mg/kg	0.04	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Tetryl	479-45-8	0.09	mg/kg	0.046	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Tetryl	479-45-8	0.09	mg/kg	0.045	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Tetryl	479-45-8	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Tetryl	479-45-8	0.075	mg/kg	0.039	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Tetryl	479-45-8	0.095	mg/kg	0.049	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Tetryl	479-45-8	0.08	mg/kg	0.0415	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Tetryl	479-45-8	0.085	mg/kg	0.0435	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	21-Aug-09	0.3	1	UU	0.17
Tetryl	479-45-8	0.07	mg/kg	0.037	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	3	5	U	0.14
Tetryl	479-45-8	0.08	mg/kg	0.041	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Thallium	7440-28-0	1.45	mg/kg	1	U	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1	U	2.9
Thallium	7440-28-0	0.31	mg/kg	0.21	U	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5	U	0.62
Thallium	7440-28-0	0.315	mg/kg	0.21	U	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1	U	0.63
Thallium	7440-28-0	3.25	mg/kg	4.6	U	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3	U	6.5
Thallium	7440-28-0	3.25	mg/kg	4.3	U	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7	U	6.5
Thallium	7440-28-0	3	mg/kg	2	U	ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8	U	6
Thallium	7440-28-0	0.29	mg/kg	0.2	U	ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5	U	0.58
Thallium	7440-28-0	2.6	mg/kg	2.2	U	ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1	U	5.2
Thallium	7440-28-0	1.25	mg/kg	1.05	U	ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2	U	2.5
Thallium	7440-28-0	3	mg/kg	0.53		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		1.6
Thallium	7440-28-0	2.9	mg/kg	0.67		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		2
Thallium	7440-28-0	0.46	mg/kg	0.31	U	ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1	U	0.92
Thallium	7440-28-0	0.315	mg/kg	0.22	UU	ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2	UU	0.63
Thallium	7440-28-0	0.725	mg/kg	0.49	UU	ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	21-Aug-09	0.3	1	UU	1.45
Thallium	7440-28-0	0.5	mg/kg	0.2	J	ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	3	5	B	0.59
Thallium	7440-28-0	0.305	mg/kg	0.21	U	ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7	U	0.61
Trichlorobenzene, 1,2,4-	120-82-1	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Trichlorobenzene, 1,2,4-	120-82-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Trichlorobenzene, 1,2,4-	120-82-1	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Trichlorobenzene, 1,2,4-	120-82-1	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Trichlorobenzene, 1,2,4-	120-82-1	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Trichlorobenzene, 1,2,4-	120-82-1	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Trichlorobenzene, 1,2,4-	120-82-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Trichlorobenzene, 1,2,4-	120-82-1	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Trichlorobenzene, 1,2,4-	120-82-1	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Trichlorobenzene, 1,2,4-	120-82-1	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Trichlorobenzene, 1,2,4-	120-82-1	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Trichlorobenzene, 1,2,4-	120-82-1	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Trichlorobenzene, 1,2,4-	120-82-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Trichlorobenzene, 1,2,4-	120-82-1	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Trichlorophenol, 2,4,5-	95-95-4	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Trichlorophenol, 2,4,5-	95-95-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Trichlorophenol, 2,4,5-	95-95-4	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Trichlorophenol, 2,4,5-	95-95-4	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Trichlorophenol, 2,4,5-	95-95-4	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Trichlorophenol, 2,4,5-	95-95-4	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Trichlorophenol, 2,4,5-	95-95-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Trichlorophenol, 2,4,5-	95-95-4	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Trichlorophenol, 2,4,5-	95-95-4	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Trichlorophenol, 2,4,5-	95-95-4	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Trichlorophenol, 2,4,5-	95-95-4	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Trichlorophenol, 2,4,5-	95-95-4	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Trichlorophenol, 2,4,5-	95-95-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Trichlorophenol, 2,4,5-	95-95-4	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Trichlorophenol, 2,4,6-	88-06-2	0.125	mg/kg	0.049	U	ASH PIT 3-SB01	AP0032	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.25
Trichlorophenol, 2,4,6-	88-06-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB01	AP0033	SEMIVOLATILES	REG	19-Aug-09	3	5	U	0.2
Trichlorophenol, 2,4,6-	88-06-2	0.105	mg/kg	0.043	U	ASH PIT 3-SB02	AP0036	SEMIVOLATILES	REG	19-Aug-09	0	1	U	0.21
Trichlorophenol, 2,4,6-	88-06-2	0.23	mg/kg	0.092	U	ASH PIT 3-SB02	AP0037	SEMIVOLATILES	REG	19-Aug-09	1.2	2.3	U	0.46
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.085	U	ASH PIT 3-SB03	AP0039	SEMIVOLATILES	REG	19-Aug-09	0.2	1.7	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.245	mg/kg	0.099	U	ASH PIT 3-SB04	AP0042	SEMIVOLATILES	REG	21-Aug-09	0.3	0.8	U	0.49
Trichlorophenol, 2,4,6-	88-06-2	0.1	mg/kg	0.041	U	ASH PIT 3-SB04	AP0043	SEMIVOLATILES	REG	21-Aug-09	0.8	1.5	U	0.2
Trichlorophenol, 2,4,6-	88-06-2	0.215	mg/kg	0.087	U	ASH PIT 3-SB05	AP0045	SEMIVOLATILES	REG	21-Aug-09	0.3	1	U	0.43
Trichlorophenol, 2,4,6-	88-06-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB05	AP0046	SEMIVOLATILES	REG	21-Aug-09	1	2	U	0.21
Trichlorophenol, 2,4,6-	88-06-2	0.13	mg/kg	0.052	U	ASH PIT 3-SB06	AP0048	SEMIVOLATILES	REG	20-Aug-09	0.2	1	U	0.26
Trichlorophenol, 2,4,6-	88-06-2	0.17	mg/kg	0.068	U	ASH PIT 3-SB06	AP0049	SEMIVOLATILES	REG	20-Aug-09	1	2	U	0.34
Trichlorophenol, 2,4,6-	88-06-2	0.155	mg/kg	0.063	U	ASH PIT 3-SB07	AP0051	SEMIVOLATILES	REG	21-Aug-09	0	1	U	0.31
Trichlorophenol, 2,4,6-	88-06-2	0.1075	mg/kg	0.0425	UU	ASH PIT 3-SB07	AP0052AP0059	SEMIVOLATILES	REGFD	40046	1	2	UU	0.215
Trichlorophenol, 2,4,6-	88-06-2	0.2475	mg/kg	0.099	UU	ASH PIT 3-SB08	AP0054AP0056	SEMIVOLATILES	REGFD	21-Aug-09	0.3	1	UU	0.495
Trichlorophenol, 2,4,6-	88-06-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB08	AP0055	SEMIVOLATILES	REG	21-Aug-09	3	5	U	0.21
Trichlorophenol, 2,4,6-	88-06-2	0.105	mg/kg	0.042	U	ASH PIT 3-SB06	AP0061A	SEMIVOLATILES	REG	20-Aug-09	2	2.7	U	0.21
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.045	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Trinitrobenzene, 1,3,5-	99-35-4	0.075	mg/kg	0.038	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.04	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.044	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.047	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Trinitrobenzene, 1,3,5-	99-35-4	0.085	mg/kg	0.044	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.039	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.045	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.044	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.075	mg/kg	0.038	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Trinitrobenzene, 1,3,5-	99-35-4	0.095	mg/kg	0.048	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.0405	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.085	mg/kg	0.0425	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	40046	0.3	1	UU	0.17
Trinitrobenzene, 1,3,5-	99-35-4	0.07	mg/kg	0.036	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.14
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.045	U	ASH PIT 3-SB01	AP0032	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.075	mg/kg	0.038	U	ASH PIT 3-SB01	AP0033	EXPLOSIVES	REG	19-Aug-09	3	5	U	0.15
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.04	U	ASH PIT 3-SB02	AP0036	EXPLOSIVES	REG	19-Aug-09	0	1	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.044	U	ASH PIT 3-SB02	AP0037	EXPLOSIVES	REG	19-Aug-09	1.2	2.3	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.047	U	ASH PIT 3-SB03	AP0039	EXPLOSIVES	REG	19-Aug-09	0.2	1.7	U	0.19
Trinitrotoluene, 2,4,6-	118-96-7	0.085	mg/kg	0.044	U	ASH PIT 3-SB04	AP0042	EXPLOSIVES	REG	21-Aug-09	0.3	0.8	U	0.17
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.039	U	ASH PIT 3-SB04	AP0043	EXPLOSIVES	REG	21-Aug-09	0.8	1.5	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.045	U	ASH PIT 3-SB05	AP0045	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.044	U	ASH PIT 3-SB05	AP0046	EXPLOSIVES	REG	21-Aug-09	1	2	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0048	EXPLOSIVES	REG	20-Aug-09	0.2	1	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.075	mg/kg	0.038	U	ASH PIT 3-SB06	AP0049	EXPLOSIVES	REG	20-Aug-09	1	2	U	0.15
Trinitrotoluene, 2,4,6-	118-96-7	0.095	mg/kg	0.048	U	ASH PIT 3-SB07	AP0051	EXPLOSIVES	REG	21-Aug-09	0	1	U	0.19
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.0405	UU	ASH PIT 3-SB07	AP0052AP0059	EXPLOSIVES	REGFD	40046	1	2	UU	0.16

Table F-1
Soil Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Trinitrotoluene, 2,4,6-	118-96-7	0.085	mg/kg	0.0425	UU	ASH PIT 3-SB08	AP0054AP0056	EXPLOSIVES	REGFD	40046	0.3	1	UU	0.17
Trinitrotoluene, 2,4,6-	118-96-7	0.07	mg/kg	0.036	U	ASH PIT 3-SB08	AP0055	EXPLOSIVES	REG	21-Aug-09	0.3	1	U	0.14
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.04	U	ASH PIT 3-SB06	AP0061A	EXPLOSIVES	REG	20-Aug-09	2	2.7	U	0.16
Vanadium	7440-62-2	14.1	mg/kg	0.048		ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		3.6
Vanadium	7440-62-2	16.3	mg/kg	0.041		ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		3.1
Vanadium	7440-62-2	19.3	mg/kg	0.042		ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		3.1
Vanadium	7440-62-2	24.3	mg/kg	0.089		ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		6.7
Vanadium	7440-62-2	23.2	mg/kg	0.083		ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		6.3
Vanadium	7440-62-2	28.4	mg/kg	0.097		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		7.4
Vanadium	7440-62-2	13.3	mg/kg	0.039		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		2.9
Vanadium	7440-62-2	23.7	mg/kg	0.085		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		6.5
Vanadium	7440-62-2	15.5	mg/kg	0.041		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		3.1
Vanadium	7440-62-2	15.1	mg/kg	0.1		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		7.8
Vanadium	7440-62-2	19.5	mg/kg	0.13		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		9.9
Vanadium	7440-62-2	10.7	mg/kg	0.061		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		4.6
Vanadium	7440-62-2	21.5	mg/kg	0.042		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		3.2
Vanadium	7440-62-2	28.9	mg/kg	0.097		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		7.2
Vanadium	7440-62-2	20.3	mg/kg	0.039		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	0.3	1		3
Vanadium	7440-62-2	17.7	mg/kg	0.04		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		3
Zinc	7440-66-6	70.5	mg/kg	0.27	J	ASH PIT 3-SB01	AP0032	METALS	REG	19-Aug-09	0	1		1.4
Zinc	7440-66-6	44.7	mg/kg	0.24	J	ASH PIT 3-SB01	AP0033	METALS	REG	19-Aug-09	3	5		1.2
Zinc	7440-66-6	40.4	mg/kg	0.24	J	ASH PIT 3-SB02	AP0036	METALS	REG	19-Aug-09	0	1		1.3
Zinc	7440-66-6	30.5	mg/kg	0.51	J	ASH PIT 3-SB02	AP0037	METALS	REG	19-Aug-09	1.2	2.3		2.7
Zinc	7440-66-6	15.9	mg/kg	0.48	J	ASH PIT 3-SB03	AP0039	METALS	REG	19-Aug-09	0.2	1.7		2.5
Zinc	7440-66-6	68.3	mg/kg	0.56		ASH PIT 3-SB04	AP0042	METALS	REG	21-Aug-09	0.3	0.8		2.9
Zinc	7440-66-6	37	mg/kg	0.22		ASH PIT 3-SB04	AP0043	METALS	REG	21-Aug-09	0.8	1.5		1.2
Zinc	7440-66-6	66.3	mg/kg	0.49		ASH PIT 3-SB05	AP0045	METALS	REG	21-Aug-09	0.3	1		2.6
Zinc	7440-66-6	41.6	mg/kg	0.24		ASH PIT 3-SB05	AP0046	METALS	REG	21-Aug-09	1	2		1.2
Zinc	7440-66-6	17.2	mg/kg	0.3		ASH PIT 3-SB06	AP0048	METALS	REG	20-Aug-09	0.2	1		1.6
Zinc	7440-66-6	31.3	mg/kg	0.38		ASH PIT 3-SB06	AP0049	METALS	REG	20-Aug-09	1	2		2
Zinc	7440-66-6	78.7	mg/kg	0.35		ASH PIT 3-SB07	AP0051	METALS	REG	21-Aug-09	0	1		1.8
Zinc	7440-66-6	51.35	mg/kg	0.24		ASH PIT 3-SB07	AP0052AP0059	METALS	REGFD	40046	1	2		1.3
Zinc	7440-66-6	34	mg/kg	0.55		ASH PIT 3-SB08	AP0054AP0056	METALS	REGFD	40046	0.3	1		2.85
Zinc	7440-66-6	50.6	mg/kg	0.22		ASH PIT 3-SB08	AP0055	METALS	REG	21-Aug-09	0.3	1		1.2
Zinc	7440-66-6	49.3	mg/kg	0.23		ASH PIT 3-SB06	AP0061A	METALS	REG	20-Aug-09	2	2.7		1.2

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Acenaphthene	83-32-9	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Acenaphthene	83-32-9	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Acenaphthene	83-32-9	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Acenaphthylene	208-96-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Acenaphthylene	208-96-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Acenaphthylene	208-96-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Aluminum	7429-90-5	100	ug/L	200	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	200
Aluminum	7429-90-5	100	ug/L	200	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	200
Aluminum	7429-90-5	100	ug/L	200	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	200
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.048	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.048	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.1	ug/L	0.049	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.073	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.073	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.1	ug/L	0.075	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Anthracene	120-12-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Anthracene	120-12-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Anthracene	120-12-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Antimony	7440-36-0	5	ug/L	10	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	10
Antimony	7440-36-0	5	ug/L	10	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	10
Antimony	7440-36-0	5	ug/L	10	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	10
Arsenic	7440-38-2	5	ug/L	10	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	10
Arsenic	7440-38-2	5	ug/L	10	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	10
Arsenic	7440-38-2	5	ug/L	10	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	10
Barium	7440-39-3	100	ug/L	200	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	200
Barium	7440-39-3	100	ug/L	200	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	200
Barium	7440-39-3	100	ug/L	200	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	200
Benzo(a)anthracene	56-55-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(a)anthracene	56-55-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(a)anthracene	56-55-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Benzo(a)pyrene	50-32-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(a)pyrene	50-32-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(a)pyrene	50-32-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Benzo(b)fluoranthene	205-99-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(b)fluoranthene	205-99-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(b)fluoranthene	205-99-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Benzo(ghi)perylene	191-24-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(ghi)perylene	191-24-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(ghi)perylene	191-24-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Benzo(k)fluoranthene	207-08-9	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(k)fluoranthene	207-08-9	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Benzo(k)fluoranthene	207-08-9	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Beryllium	7440-41-7	2.5	ug/L	5	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	5
Beryllium	7440-41-7	2.5	ug/L	5	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5
Beryllium	7440-41-7	2.5	ug/L	5	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	5
Bis(2-chloroethoxy)methane	111-91-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroethoxy)methane	111-91-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroethoxy)methane	111-91-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Bis(2-chloroethyl)ether	111-44-4	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroethyl)ether	111-44-4	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroethyl)ether	111-44-4	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Bis(2-chloroisopropyl)ether	108-60-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroisopropyl)ether	108-60-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-chloroisopropyl)ether	108-60-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Bis(2-ethylhexyl)phthalate	117-81-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-ethylhexyl)phthalate	117-81-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bis(2-ethylhexyl)phthalate	117-81-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Bromophenyl phenyl ether, 4-	101-55-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bromophenyl phenyl ether, 4-	101-55-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Bromophenyl phenyl ether, 4-	101-55-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Butyl benzyl phthalate	85-68-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Butyl benzyl phthalate	85-68-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Butyl benzyl phthalate	85-68-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Cadmium	7440-43-9	1	ug/L	2	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	2
Cadmium	7440-43-9	1	ug/L	2	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	2
Cadmium	7440-43-9	1	ug/L	2	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	2
Calcium	7440-70-2	####	ug/L	5000		PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0		5000
Calcium	7440-70-2	####	ug/L	5000		PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0		5000
Calcium	7440-70-2	####	ug/L	5000		PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0		5000
Carbazole	86-74-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Carbazole	86-74-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Carbazole	86-74-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Chloro-3-methylphenol, 4-	59-50-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloro-3-methylphenol, 4-	59-50-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloro-3-methylphenol, 4-	59-50-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Chloroaniline, 4-	106-47-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloroaniline, 4-	106-47-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloroaniline, 4-	106-47-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Chloronaphthalene, 2-	91-58-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloronaphthalene, 2-	91-58-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chloronaphthalene, 2-	91-58-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Chlorophenol, 2-	95-57-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chlorophenol, 2-	95-57-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chlorophenol, 2-	95-57-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Chlorophenyl phenyl ether, 4-	7005-72-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chlorophenyl phenyl ether, 4-	7005-72-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chlorophenyl phenyl ether, 4-	7005-72-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Chromium	7440-47-3	2.5	ug/L	5	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	5
Chromium	7440-47-3	2.5	ug/L	5	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5
Chromium	7440-47-3	2.5	ug/L	5	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	5
Chrysene	218-01-9	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chrysene	218-01-9	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Chrysene	218-01-9	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Cobalt	7440-48-4	25	ug/L	50	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	50
Cobalt	7440-48-4	25	ug/L	50	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	50
Cobalt	7440-48-4	25	ug/L	50	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	50
Copper	7440-50-8	12.5	ug/L	25	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	25
Copper	7440-50-8	12.5	ug/L	25	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	25
Copper	7440-50-8	12.5	ug/L	25	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	25
Dibenz(a,h)anthracene	53-70-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dibenz(a,h)anthracene	53-70-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dibenz(a,h)anthracene	53-70-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dibenzofuran	132-64-9	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dibenzofuran	132-64-9	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dibenzofuran	132-64-9	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dichlorobenzene, 1,2-	95-50-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,2-	95-50-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,2-	95-50-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dichlorobenzene, 1,3-	541-73-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,3-	541-73-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,3-	541-73-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dichlorobenzene, 1,4-	106-46-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,4-	106-46-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzene, 1,4-	106-46-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorobenzidine, 3,3'-	91-94-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dichlorophenol, 2,4-	120-83-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorophenol, 2,4-	120-83-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dichlorophenol, 2,4-	120-83-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Diethyl phthalate	84-66-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Diethyl phthalate	84-66-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Diethyl phthalate	84-66-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dimethyl phthalate	131-11-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dimethyl phthalate	131-11-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dimethyl phthalate	131-11-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dimethylphenol, 2,4-	105-67-9	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dimethylphenol, 2,4-	105-67-9	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dimethylphenol, 2,4-	105-67-9	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Di-n-butyl phthalate	84-74-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Di-n-butyl phthalate	84-74-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Di-n-butyl phthalate	84-74-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dinitro-2-methylphenol, 4,6-	534-52-1	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Dinitro-2-methylphenol, 4,6-	534-52-1	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Dinitro-2-methylphenol, 4,6-	534-52-1	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.049	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.049	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrobenzene, 1,3-	99-65-0	0.1	ug/L	0.05	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Dinitrophenol, 2,4-	51-28-5	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Dinitrotoluene, 2,4-	121-14-2	0.1	ug/L	0.062	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrotoluene, 2,4-	121-14-2	0.1	ug/L	0.062	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrotoluene, 2,4-	121-14-2	0.1	ug/L	0.063	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Dinitrotoluene, 2,4-	121-14-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dinitrotoluene, 2,4-	121-14-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dinitrotoluene, 2,4-	121-14-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Dinitrotoluene, 2,6-	606-20-2	0.1	ug/L	0.089	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrotoluene, 2,6-	606-20-2	0.1	ug/L	0.089	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Dinitrotoluene, 2,6-	606-20-2	0.1	ug/L	0.09	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dinitrotoluene, 2,6-	606-20-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dinitrotoluene, 2,6-	606-20-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Dinitrotoluene, 2,6-	606-20-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Di-n-octyl phthalate	117-84-0	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Di-n-octyl phthalate	117-84-0	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Di-n-octyl phthalate	117-84-0	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Fluoranthene	206-44-0	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Fluoranthene	206-44-0	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Fluoranthene	206-44-0	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Fluorene	86-73-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Fluorene	86-73-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Fluorene	86-73-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Hexachlorobenzene	118-74-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachlorobenzene	118-74-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachlorobenzene	118-74-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Hexachlorobutadiene	87-68-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachlorobutadiene	87-68-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachlorobutadiene	87-68-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Hexachloroethane	67-72-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachloroethane	67-72-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Hexachloroethane	67-72-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
HMX	2691-41-0	0.1	ug/L	0.1	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
HMX	2691-41-0	0.1	ug/L	0.1	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
HMX	2691-41-0	0.1	ug/L	0.11	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Indeno(1,2,3-cd)pyrene	193-39-5	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Indeno(1,2,3-cd)pyrene	193-39-5	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Indeno(1,2,3-cd)pyrene	193-39-5	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Iron	7439-89-6	687	ug/L	100	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	MBD	100
Iron	7439-89-6	429	ug/L	100	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	MBD	100
Iron	7439-89-6	341	ug/L	100	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	MBDMBD	100
Isophorone	78-59-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Isophorone	78-59-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Isophorone	78-59-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Lead	7439-92-1	1.5	ug/L	3	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	3
Lead	7439-92-1	1.5	ug/L	3	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	3
Lead	7439-92-1	1.5	ug/L	3	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	3
Magnesium	7439-95-4	9410	ug/L	5000		PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0		5000
Magnesium	7439-95-4	9470	ug/L	5000		PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0		5000
Magnesium	7439-95-4	8990	ug/L	5000		PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0		5000
Manganese	7439-96-5	195	ug/L	15		PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0		15
Manganese	7439-96-5	153	ug/L	15		PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0		15
Manganese	7439-96-5	41.7	ug/L	15	J	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0		15
Mercury	7439-97-6	0.1	ug/L	0.2	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	0.2
Mercury	7439-97-6	0.1	ug/L	0.2	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	0.2
Mercury	7439-97-6	0.1	ug/L	0.2	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	0.2
Methylnaphthalene, 2-	91-57-6	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylnaphthalene, 2-	91-57-6	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylnaphthalene, 2-	91-57-6	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Methylphenol, 2-	95-48-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylphenol, 2-	95-48-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylphenol, 2-	95-48-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Methylphenol, 4-	106-44-5	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylphenol, 4-	106-44-5	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Methylphenol, 4-	106-44-5	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Naphthalene	91-20-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Naphthalene	91-20-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Naphthalene	91-20-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Nickel	7440-02-0	20	ug/L	40	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	40
Nickel	7440-02-0	20	ug/L	40	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	40
Nickel	7440-02-0	20	ug/L	40	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	40
Nitroaniline, 2-	88-74-4	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 2-	88-74-4	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 2-	88-74-4	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Nitroaniline, 3-	99-09-2	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 3-	99-09-2	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 3-	99-09-2	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Nitroaniline, 4-	100-01-6	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 4-	100-01-6	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitroaniline, 4-	100-01-6	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Nitrobenzene	98-95-3	0.1	ug/L	0.048	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrobenzene	98-95-3	0.1	ug/L	0.048	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrobenzene	98-95-3	0.1	ug/L	0.049	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Nitrobenzene	98-95-3	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Nitrobenzene	98-95-3	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Nitrobenzene	98-95-3	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10

Table F-2
Surface Water Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Nitrophenol, 2-	88-75-5	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Nitrophenol, 2-	88-75-5	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Nitrophenol, 2-	88-75-5	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Nitrophenol, 4-	100-02-7	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.061	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.061	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 2-	88-72-2	0.1	ug/L	0.062	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.092	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.092	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 3-	99-08-1	0.1	ug/L	0.094	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.072	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.072	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Nitrotoluene, 4-	99-99-0	0.1	ug/L	0.074	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
n-Nitroso-di-n-propylamine	621-64-7	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
n-Nitroso-di-n-propylamine	621-64-7	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
n-Nitroso-di-n-propylamine	621-64-7	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
n-Nitrosodiphenylamine	86-30-6	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
n-Nitrosodiphenylamine	86-30-6	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
n-Nitrosodiphenylamine	86-30-6	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Pentachlorophenol	87-86-5	12.5	ug/L	25	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Pentachlorophenol	87-86-5	12.5	ug/L	25	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	25
Pentachlorophenol	87-86-5	12.5	ug/L	25	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	25
Phenanthrene	85-01-8	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Phenanthrene	85-01-8	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Phenanthrene	85-01-8	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Phenol	108-95-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Phenol	108-95-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Phenol	108-95-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Potassium	7440-09-7	2500	ug/L	5000	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	5000
Potassium	7440-09-7	2500	ug/L	5000	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5000
Potassium	7440-09-7	2500	ug/L	5000	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	5000
Pyrene	129-00-0	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Pyrene	129-00-0	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Pyrene	129-00-0	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
RDX	121-82-4	0.1	ug/L	0.071	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
RDX	121-82-4	0.1	ug/L	0.071	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
RDX	121-82-4	0.1	ug/L	0.073	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Selenium	7782-49-2	2.5	ug/L	5	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	5
Selenium	7782-49-2	2.5	ug/L	5	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5
Selenium	7782-49-2	2.5	ug/L	5	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	5
Silver	7440-22-4	2.5	ug/L	5	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	5
Silver	7440-22-4	2.5	ug/L	5	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5
Silver	7440-22-4	2.5	ug/L	5	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	5
Sodium	7440-23-5	9740	ug/L	5000		PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0		5000
Sodium	7440-23-5	2500	ug/L	5000	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	5000
Sodium	7440-23-5	####	ug/L	5000		PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0		5000
Tetryl	479-45-8	0.1	ug/L	0.074	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Tetryl	479-45-8	0.1	ug/L	0.074	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Tetryl	479-45-8	0.1	ug/L	0.076	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Thallium	7440-28-0	5	ug/L	10	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	10
Thallium	7440-28-0	5	ug/L	10	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	10
Thallium	7440-28-0	5	ug/L	10	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	10
Trichlorobenzene, 1,2,4-	120-82-1	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorobenzene, 1,2,4-	120-82-1	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorobenzene, 1,2,4-	120-82-1	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Trichlorophenol, 2,4,5-	95-95-4	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorophenol, 2,4,5-	95-95-4	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorophenol, 2,4,5-	95-95-4	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Trichlorophenol, 2,4,6-	88-06-2	5	ug/L	10	UJ	PBOW99-SWA301	PBOW99SWA301	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorophenol, 2,4,6-	88-06-2	5	ug/L	10	UJ	PBOW99-SWA302	PBOW99SWA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	10
Trichlorophenol, 2,4,6-	88-06-2	5	ug/L	10	UJUJ	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	SEMIVOLATILESSEMIVOLATILES	REGFD	36322	0	0	UU	10
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.048	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.048	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Trinitrobenzene, 1,3,5-	99-35-4	0.1	ug/L	0.049	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.066	UJ	AP3-SW01	AP2009	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.066	U	AP3-SW02	AP2010	EXPLOSIVES	REG	23-May-09	0	0	U	0.19
Trinitrotoluene, 2,4,6-	118-96-7	0.1	ug/L	0.067	U	AP3-SW03	AP2011A	EXPLOSIVES	REG	27-May-09	0	0	U	0.19
Vanadium	7440-62-2	25	ug/L	50	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	50
Vanadium	7440-62-2	25	ug/L	50	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	50
Vanadium	7440-62-2	25	ug/L	50	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	50
Zinc	7440-66-6	10	ug/L	20	U	PBOW99-SWA301	PBOW99SWA301	METALS	REG	11-Jun-99	0	0	U	20
Zinc	7440-66-6	10	ug/L	20	U	PBOW99-SWA302	PBOW99SWA302	METALS	REG	11-Jun-99	0	0	U	20
Zinc	7440-66-6	10	ug/L	20	UU	PBOW99-SWA303	PBOW99SWA303PBOW99SWA303DUP	METALSMETALS	REGFD	36322	0	0	UU	20

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
3-Methylphenol and 4-Methylphenol	65794-96-9	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Acenaphthene	83-32-9	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Acenaphthene	83-32-9	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Acenaphthene	83-32-9	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Acenaphthylene	208-96-8	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Acenaphthylene	208-96-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Acenaphthylene	208-96-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Aluminum	7429-90-5	3610	mg/kg	0.99		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		18
Aluminum	7429-90-5	7750	mg/kg	33.1		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		33.1
Aluminum	7429-90-5	2475	mg/kg	30.35	J	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		30.35
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.08	mg/kg	0.041	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.045	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Amino-2,6-dinitrotoluene, 4-	19406-51-0	0.09	mg/kg	0.045	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.08	mg/kg	0.089	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.099	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Amino-4,6-dinitrotoluene, 2-	35572-78-2	0.09	mg/kg	0.099	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Anthracene	120-12-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Anthracene	120-12-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Anthracene	120-12-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Antimony	7440-36-0	0.54	mg/kg	0.41	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	5.4
Antimony	7440-36-0	0.85	mg/kg	1.7	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	1.7
Antimony	7440-36-0	0.75	mg/kg	1.5	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	1.5
Aroclor 1016	12674-11-2	0.016	mg/kg	0.015	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1016	12674-11-2	0.015	mg/kg	0.015	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1016	12674-11-2	0.012	mg/kg	0.012	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1221	11104-28-2	0.016	mg/kg	0.025	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1221	11104-28-2	0.015	mg/kg	0.024	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1221	11104-28-2	0.012	mg/kg	0.019	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1232	11141-16-5	0.016	mg/kg	0.025	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1232	11141-16-5	0.015	mg/kg	0.024	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1232	11141-16-5	0.012	mg/kg	0.019	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1242	53469-21-9	0.016	mg/kg	0.015	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1242	53469-21-9	0.015	mg/kg	0.015	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1242	53469-21-9	0.012	mg/kg	0.012	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1248	12672-29-6	0.016	mg/kg	0.015	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1248	12672-29-6	0.015	mg/kg	0.015	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1248	12672-29-6	0.012	mg/kg	0.012	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1254	11097-69-1	0.016	mg/kg	0.015	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1254	11097-69-1	0.015	mg/kg	0.015	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1254	11097-69-1	0.012	mg/kg	0.012	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Aroclor 1260	11096-82-5	0.016	mg/kg	0.015	U	AP3-SD01	AP1009	PEST/PCB	REG	23-May-09	0	0.5	U	0.031
Aroclor 1260	11096-82-5	0.015	mg/kg	0.015	U	AP3-SD02	AP1010	PEST/PCB	REG	23-May-09	0	0.5	U	0.03
Aroclor 1260	11096-82-5	0.012	mg/kg	0.012	U	AP3-SD03	AP1011	PEST/PCB	REG	23-May-09	0	0.5	U	0.024
Arsenic	7440-38-2	6.4	mg/kg	0.32		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		0.72
Arsenic	7440-38-2	5.9	mg/kg	1.7		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		1.7
Arsenic	7440-38-2	3.7	mg/kg	1.5		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		1.5
Barium	7440-39-3	26.6	mg/kg	0.45		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		18
Barium	7440-39-3	47.8	mg/kg	33.1		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		33.1
Barium	7440-39-3	15.18	mg/kg	30.35	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	30.35
Benzo(a)anthracene	56-55-3	0.143	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Benzo(a)anthracene	56-55-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Benzo(a)anthracene	56-55-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Benzo(a)pyrene	50-32-8	0.158	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Benzo(a)pyrene	50-32-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Benzo(a)pyrene	50-32-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Benzo(b)fluoranthene	205-99-2	0.24	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Benzo(b)fluoranthene	205-99-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Benzo(b)fluoranthene	205-99-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Benzo(ghi)perylene	191-24-2	0.101	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Benzo(ghi)perylene	191-24-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Benzo(ghi)perylene	191-24-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Benzo(k)fluoranthene	207-08-9	0.081	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Benzo(k)fluoranthene	207-08-9	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Benzo(k)fluoranthene	207-08-9	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Benzoic acid	65-85-0	0.75	mg/kg	0.61	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	1.5
Benzyl alcohol	100-51-6	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Beryllium	7440-41-7	0.26	mg/kg	0.09	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	0.45
Beryllium	7440-41-7	0.415	mg/kg	0.83	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	0.83
Beryllium	7440-41-7	0.378	mg/kg	0.755	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	0.755
Bis(2-chloroethoxy)methane	111-91-1	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Bis(2-chloroethoxy)methane	111-91-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Bis(2-chloroethoxy)methane	111-91-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Bis(2-chloroethyl)ether	111-44-4	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Bis(2-chloroethyl)ether	111-44-4	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Bis(2-chloroethyl)ether	111-44-4	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Bis(2-chloroisopropyl)ether	108-60-1	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Bis(2-chloroisopropyl)ether	108-60-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Bis(2-chloroisopropyl)ether	108-60-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Bis(2-ethylhexyl)phthalate	117-81-7	0.305	mg/kg	0.31	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Bis(2-ethylhexyl)phthalate	117-81-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Bis(2-ethylhexyl)phthalate	117-81-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Bromophenyl phenyl ether, 4-	101-55-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Bromophenyl phenyl ether, 4-	101-55-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Bromophenyl phenyl ether, 4-	101-55-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Butyl benzyl phthalate	85-68-7	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Butyl benzyl phthalate	85-68-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Butyl benzyl phthalate	85-68-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Cadmium	7440-43-9	0.3	mg/kg	0.09	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	0.36
Cadmium	7440-43-9	0.165	mg/kg	0.33	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	0.33
Cadmium	7440-43-9	0.153	mg/kg	0.305	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	0.305
Calcium	7440-70-2	9610	mg/kg	9	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		450
Calcium	7440-70-2	18100	mg/kg	828		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		828
Calcium	7440-70-2	5090	mg/kg	758.5		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		758.5
Carbazole	86-74-8	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Carbazole	86-74-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Carbazole	86-74-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chloro-3-methylphenol, 4-	59-50-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Chloro-3-methylphenol, 4-	59-50-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chloro-3-methylphenol, 4-	59-50-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chloroaniline, 4-	106-47-8	0.155	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Chloroaniline, 4-	106-47-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chloroaniline, 4-	106-47-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chloronaphthalene, 2-	91-58-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Chloronaphthalene, 2-	91-58-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chloronaphthalene, 2-	91-58-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chlorophenol, 2-	95-57-8	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Chlorophenol, 2-	95-57-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chlorophenol, 2-	95-57-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chlorophenyl phenyl ether, 4-	7005-72-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Chlorophenyl phenyl ether, 4-	7005-72-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chlorophenyl phenyl ether, 4-	7005-72-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Chromium	7440-47-3	6.4	mg/kg	0.14		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		0.9
Chromium	7440-47-3	10.8	mg/kg	0.83		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		0.83
Chromium	7440-47-3	5.4	mg/kg	0.755		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		0.755
Chrysene	218-01-9	0.159	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Chrysene	218-01-9	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Chrysene	218-01-9	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Cobalt	7440-48-4	4.1	mg/kg	0.075	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	4.5
Cobalt	7440-48-4	4.15	mg/kg	8.3	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	8.3
Cobalt	7440-48-4	3.775	mg/kg	7.55	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	7.55
Copper	7440-50-8	126	mg/kg	0.19		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		2.3
Copper	7440-50-8	14.4	mg/kg	4.1		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		4.1
Copper	7440-50-8	74	mg/kg	3.8		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		3.8
Dibenz(a,h)anthracene	53-70-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dibenz(a,h)anthracene	53-70-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dibenz(a,h)anthracene	53-70-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dibenzofuran	132-64-9	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dibenzofuran	132-64-9	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dibenzofuran	132-64-9	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dichlorobenzene, 1,2-	95-50-1	0.155	mg/kg	0.08	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dichlorobenzene, 1,2-	95-50-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dichlorobenzene, 1,2-	95-50-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dichlorobenzene, 1,3-	541-73-1	0.155	mg/kg	0.08	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dichlorobenzene, 1,3-	541-73-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dichlorobenzene, 1,3-	541-73-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dichlorobenzene, 1,4-	106-46-7	0.155	mg/kg	0.074	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dichlorobenzene, 1,4-	106-46-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dichlorobenzene, 1,4-	106-46-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dichlorobenzidine, 3,3'-	91-94-1	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Dichlorobenzidine, 3,3'-	91-94-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Dichlorobenzidine, 3,3'-	91-94-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dichlorophenol, 2,4-	120-83-2	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dichlorophenol, 2,4-	120-83-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dichlorophenol, 2,4-	120-83-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Diethyl phthalate	84-66-2	0.305	mg/kg	0.31	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Diethyl phthalate	84-66-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Diethyl phthalate	84-66-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dimethyl phthalate	131-11-3	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Dimethyl phthalate	131-11-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dimethyl phthalate	131-11-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dimethylphenol, 2,4-	105-67-9	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dimethylphenol, 2,4-	105-67-9	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dimethylphenol, 2,4-	105-67-9	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Di-n-butyl phthalate	84-74-2	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Di-n-butyl phthalate	84-74-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Di-n-butyl phthalate	84-74-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dinitro-2-methylphenol, 4,6-	534-52-1	0.305	mg/kg	0.2	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Dinitro-2-methylphenol, 4,6-	534-52-1	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Dinitro-2-methylphenol, 4,6-	534-52-1	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Dinitrobenzene, 1,3-	99-65-0	0.08	mg/kg	0.043	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.048	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrobenzene, 1,3-	99-65-0	0.09	mg/kg	0.048	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrophenol, 2,4-	51-28-5	0.75	mg/kg	0.61	UJ	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	1.5
Dinitrophenol, 2,4-	51-28-5	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Dinitrophenol, 2,4-	51-28-5	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Dinitrotoluene, 2,4-	121-14-2	0.08	mg/kg	0.049	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Dinitrotoluene, 2,4-	121-14-2	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dinitrotoluene, 2,4-	121-14-2	0.09	mg/kg	0.055	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrotoluene, 2,4-	121-14-2	0.09	mg/kg	0.055	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrotoluene, 2,4-	121-14-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dinitrotoluene, 2,4-	121-14-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Dinitrotoluene, 2,6-	606-20-2	0.08	mg/kg	0.043	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Dinitrotoluene, 2,6-	606-20-2	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Dinitrotoluene, 2,6-	606-20-2	0.09	mg/kg	0.048	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrotoluene, 2,6-	606-20-2	0.09	mg/kg	0.048	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Dinitrotoluene, 2,6-	606-20-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Dinitrotoluene, 2,6-	606-20-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Di-n-octyl phthalate	117-84-0	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Di-n-octyl phthalate	117-84-0	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Di-n-octyl phthalate	117-84-0	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Fluoranthene	206-44-0	0.253	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Fluoranthene	206-44-0	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Fluoranthene	206-44-0	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Fluorene	86-73-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Fluorene	86-73-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Fluorene	86-73-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Hexachlorobenzene	118-74-1	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Hexachlorobenzene	118-74-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Hexachlorobenzene	118-74-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Hexachlorobutadiene	87-68-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Hexachlorobutadiene	87-68-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Hexachlorobutadiene	87-68-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Hexachlorocyclopentadiene	77-47-4	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Hexachlorocyclopentadiene	77-47-4	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Hexachlorocyclopentadiene	77-47-4	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Hexachloroethane	67-72-1	0.155	mg/kg	0.074	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Hexachloroethane	67-72-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Hexachloroethane	67-72-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
HMX	2691-41-0	0.08	mg/kg	0.07	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
HMX	2691-41-0	0.09	mg/kg	0.078	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
HMX	2691-41-0	0.09	mg/kg	0.078	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Indeno(1,2,3-cd)pyrene	193-39-5	0.111	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Indeno(1,2,3-cd)pyrene	193-39-5	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Indeno(1,2,3-cd)pyrene	193-39-5	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Iron	7439-89-6	13000	mg/kg	2.1	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		9
Iron	7439-89-6	12800	mg/kg	16.6		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		16.6
Iron	7439-89-6	6710	mg/kg	15.2		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		15.2
Isophorone	78-59-1	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Isophorone	78-59-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Isophorone	78-59-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Lead	7439-92-1	8.7	mg/kg	0.18	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	9
Lead	7439-92-1	11.9	mg/kg	0.5		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		0.5
Lead	7439-92-1	6.7	mg/kg	0.455		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		0.455
Magnesium	7439-95-4	4370	mg/kg	9	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		450
Magnesium	7439-95-4	5670	mg/kg	828		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		828
Magnesium	7439-95-4	2570	mg/kg	758.5		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		758.5
Manganese	7439-96-5	130	mg/kg	0.045	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		1.4
Manganese	7439-96-5	318	mg/kg	2.5		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		2.5
Manganese	7439-96-5	140.5	mg/kg	2.25		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		2.25
Mercury	7439-97-6	0.027	mg/kg	0.021	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	0.14
Mercury	7439-97-6	0.085	mg/kg	0.17	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	0.17
Mercury	7439-97-6	0.075	mg/kg	0.15	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	0.15
Methylnaphthalene, 2-	91-57-6	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Methylnaphthalene, 2-	91-57-6	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Methylnaphthalene, 2-	91-57-6	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Methylphenol, 2-	95-48-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Methylphenol, 2-	95-48-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Methylphenol, 2-	95-48-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Methylphenol, 4-	106-44-5	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Methylphenol, 4-	106-44-5	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Naphthalene	91-20-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Naphthalene	91-20-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Naphthalene	91-20-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Nickel	7440-02-0	10.5	mg/kg	0.21	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		3.6
Nickel	7440-02-0	12.5	mg/kg	6.6		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		6.6
Nickel	7440-02-0	6.55	mg/kg	6.1		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0		6.1
Nitroaniline, 2-	88-74-4	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Nitroaniline, 2-	88-74-4	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Nitroaniline, 2-	88-74-4	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Nitroaniline, 3-	99-09-2	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Nitroaniline, 3-	99-09-2	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Nitroaniline, 3-	99-09-2	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Nitroaniline, 4-	100-01-6	0.305	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.61
Nitroaniline, 4-	100-01-6	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Nitroaniline, 4-	100-01-6	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Nitrobenzene	98-95-3	0.08	mg/kg	0.054	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Nitrobenzene	98-95-3	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Nitrobenzene	98-95-3	0.09	mg/kg	0.06	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrobenzene	98-95-3	0.09	mg/kg	0.06	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrobenzene	98-95-3	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Nitrobenzene	98-95-3	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Nitrophenol, 2-	88-75-5	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Nitrophenol, 2-	88-75-5	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Nitrophenol, 2-	88-75-5	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Nitrophenol, 4-	100-02-7	0.75	mg/kg	0.61	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	1.5
Nitrophenol, 4-	100-02-7	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Nitrophenol, 4-	100-02-7	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Nitrotoluene, 2-	88-72-2	0.08	mg/kg	0.041	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.045	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrotoluene, 2-	88-72-2	0.09	mg/kg	0.045	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrotoluene, 3-	99-08-1	0.08	mg/kg	0.069	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.076	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrotoluene, 3-	99-08-1	0.09	mg/kg	0.076	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrotoluene, 4-	99-99-0	0.08	mg/kg	0.051	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.056	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Nitrotoluene, 4-	99-99-0	0.09	mg/kg	0.056	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
n-Nitroso-di-n-propylamine	621-64-7	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
n-Nitroso-di-n-propylamine	621-64-7	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
n-Nitroso-di-n-propylamine	621-64-7	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
n-Nitrosodiphenylamine	86-30-6	0.155	mg/kg	0.12	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
n-Nitrosodiphenylamine	86-30-6	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
n-Nitrosodiphenylamine	86-30-6	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Pentachlorophenol	87-86-5	0.75	mg/kg	0.61	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	1.5
Pentachlorophenol	87-86-5	0.65	mg/kg	1.3	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	1.3
Pentachlorophenol	87-86-5	0.6	mg/kg	1.2	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	1.2
Phenanthrene	85-01-8	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Phenanthrene	85-01-8	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Phenanthrene	85-01-8	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Phenol	108-95-2	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Phenol	108-95-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55

Table F-3
Sediment Data Used in the Screening-Level Ecological Risk Assessment
Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio

PARAMETER	CASNUM	RES	UNIT	METH_DET_LIM	VQUAL	LOCATION_CODE	SAMPLE_NO	USER_TEST_GROUP	PURPOSE	SAMPLE_DATE	START_DEPTH	END_DEPTH	LABQUAL	REP_LIMIT
Phenol	108-95-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Potassium	7440-09-7	337	mg/kg	9	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	B	1800
Potassium	7440-09-7	1270	mg/kg	828		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		828
Potassium	7440-09-7	379.3	mg/kg	758.5	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	758.5
Pyrene	129-00-0	0.206	mg/kg	0.061	J	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	J	0.31
Pyrene	129-00-0	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Pyrene	129-00-0	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
RDX	121-82-4	0.08	mg/kg	0.07	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
RDX	121-82-4	0.09	mg/kg	0.077	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
RDX	121-82-4	0.09	mg/kg	0.077	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Selenium	7782-49-2	1.1	mg/kg	0.83		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		0.83
Selenium	7782-49-2	0.378	mg/kg	0.755	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	0.755
Silver	7440-22-4	0.45	mg/kg	0.11	U	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	U	0.9
Silver	7440-22-4	0.415	mg/kg	0.83	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	0.83
Silver	7440-22-4	0.378	mg/kg	0.755	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	0.755
Sodium	7440-23-5	450	mg/kg	45	U	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	U	900
Sodium	7440-23-5	414	mg/kg	828	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	828
Sodium	7440-23-5	379.3	mg/kg	758.5	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	758.5
Tetryl	479-45-8	0.08	mg/kg	0.042	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Tetryl	479-45-8	0.09	mg/kg	0.046	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Tetryl	479-45-8	0.09	mg/kg	0.046	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Thallium	7440-28-0	4.5	mg/kg	3.1	U	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5	U	9
Thallium	7440-28-0	0.85	mg/kg	1.7	U	PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	U	1.7
Thallium	7440-28-0	0.75	mg/kg	1.5	UU	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	UU	1.5
Trichlorobenzene, 1,2,4-	120-82-1	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Trichlorobenzene, 1,2,4-	120-82-1	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Trichlorobenzene, 1,2,4-	120-82-1	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Trichlorophenol, 2,4,5-	95-95-4	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Trichlorophenol, 2,4,5-	95-95-4	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Trichlorophenol, 2,4,5-	95-95-4	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Trichlorophenol, 2,4,6-	88-06-2	0.155	mg/kg	0.061	U	AP3-SD01	AP1009	SEMIVOLATILES	REG	23-May-09	0	0.5	U	0.31
Trichlorophenol, 2,4,6-	88-06-2	0.275	mg/kg	0.55	UJ	PBOW99-SDA302	PBOW99SDA302	SEMIVOLATILES	REG	11-Jun-99	0	0	U	0.55
Trichlorophenol, 2,4,6-	88-06-2	0.25	mg/kg	0.5	UJUJ	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	SEMIVOLATILES	AVGD	11-Jun-99	0	0	UU	0.5
Trinitrobenzene, 1,3,5-	99-35-4	0.08	mg/kg	0.041	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.045	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Trinitrobenzene, 1,3,5-	99-35-4	0.09	mg/kg	0.045	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.08	mg/kg	0.041	U	AP3-SD01	AP1009	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.16
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.045	U	AP3-SD02	AP1010	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Trinitrotoluene, 2,4,6-	118-96-7	0.09	mg/kg	0.045	U	AP3-SD03	AP1011	EXPLOSIVES	REG	23-May-09	0	0.5	U	0.18
Vanadium	7440-62-2	11.3	mg/kg	0.06		AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		4.5
Vanadium	7440-62-2	19.3	mg/kg	8.3		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0		8.3
Vanadium	7440-62-2	6.55	mg/kg	7.55	/U	PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	U	7.55
Zinc	7440-66-6	52.8	mg/kg	0.34	J	AP3-SD01	AP1009	METALS	REG	23-May-09	0	0.5		1.8
Zinc	7440-66-6	48.3	mg/kg	3.3		PBOW99-SDA302	PBOW99SDA302	METALS	REG	11-Jun-99	0	0	MBD	3.3
Zinc	7440-66-6	26.3	mg/kg	3.05		PBOW99-SDA303	PBOW99SDA303&SDA303DUP	METALS	AVGD	11-Jun-99	0	0	MBDMBD	3.05

RESPONSE TO COMMENTS

Response to External Comments
Draft Baseline Human Health Risk Assessment and
Screening-Level Ecological Risk Assessment,
Ash Pit 1 and Ash Pit 3
Plum Brook Ordnance Works, Sandusky, Ohio,
Dated December 20, 2010
FUDS Project No. G05OH001821

Note that the following comments reference the Baseline Human Health Risk Assessment (BHHRA) for Ash Pit 1 (AP1) and Ash Pit 3 (AP3) and the Screening-Level Ecological Risk Assessment (SLERA) for AP1 and Ash Pit 3 AP3, each of which was issued as a combined AP1/AP3 report. Please note that the U.S. Army Corps of Engineers has decided to issue two separate BHHRA reports, one for AP1 and one for AP3, rather than the combined report issued previously. The AP1 and AP3 SLERAs are likewise being issued as two separate reports.

Comments by Janusz Byczkowski, Ph.D., Ohio Environmental Protection Agency (OEPA) Toxicologist, received February 17, 2011.

Comment 1: **BHHRA Executive Summary AP3 P. ES-5 L# 1 – 7 S. 7.3 P. 7-4 L# 24 and P. 7-5 L# 4. <u>This document states:</u> "… *ILCR = 1E-6 (excluding background-related arsenic)* […] *ILCR = 3E-6 (excluding background-related arsenic)*…"and then "…*apparent background-related* manganese […] *appropriately excluded* […] *background-related contribution of arsenic* […] *appropriately excluded*…" While in the Section 2.4.3.1 (P. 2-8) at least there is a sentence, that background "…*method* […] *differs from that shown in current OEPA (2004a) guidance*…" there is no such an explanation provided either in *Executive Summary,* in *Introduction*, or in *Recommendations*. To the contrary, in the *Introduction* (Sect. 1.5, P. 1-5; L# 17) this document states that "…*The BHHRA was performed consistent with* […] *Ohio Environmental Protection Agency (OEPA) guidance*…" and then (P. ES-6, L# 24) "…*background-related contributions of arsenic in AP3 soil are appropriately excluded*…" Since the *Executive Summary, Introduction* and *Recommendations,* are the parts of the document which probably will be the most read by the public, a detailed rationale for deviation from the current OEPA-DERR standard risk assessment guidance should be included as a part of the introduction of the BHHRA document. I suggest a revision of these Documents, which should follow the suggestions listed below:**

a. On *Distribution Lists* (BHHRA, SLERA) please correct the address of Janusz Z. Byczkowski.

b. Please emphasize in *Executive Summary* that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification in the *Introduction*.

Response 1: a. The corrected address shall be used for future deliverables:

Janusz Z. Byczkowski, Ph.D., D.Sc., DABT.
Div. Emergency and Remedial Response
Lazarus Government Ctr.
P.O. Box 1049
50 W. Town Str., Suite 700
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b. It is agreed that it is possible that certain stakeholders may only read the executive summary of this document. In the executive summary on page ES-3, 1st full paragraph, we will add text stating that the standard steps of risk assessment, data analysis, exposure assessment, toxicity assessment, risk characterization, uncertainty analysis were executed in the risk assessment. Data analysis for inorganic constituents differs from OEPA-DERR 2004, and is further described in Section 2.4.3.1 Background Screening of Inorganics.

Comment 2: **BHHRA S. 3.2.1 P. 3-19 L# 17 and P. 3-20 L# 3 Also, Tables 2-6 to 2-9; 2-11; 2-13; 2-14; and Appendix B. This document states: "…*One-half the reporting limit is used as the ProUCL input concentration for nondetects*…" The ProUCL ver 4.0.(05) should be used for modeling/calculating reasonable maximum exposure (RMEs) with 100% reporting limit (RL) as input concentration for nondetects (but not for screening, or calculations of background concentration). For screening- selecting COPCs, on the other hand, it is appropriate to use the MAXIMUM concentration in each medium or 1/2 of the Reporting Limit (RL) if the nondetect RL exceeds the toxicity-based screening concentration (=0.1 x RSL for non-carcinogenic or 1.0 x RSL for carcinogenic chemicals). Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: Maximum detected concentrations (MDC) were used in the data analysis screening portion of the risk assessment. The exposure point concentration (EPC) protocol used in the BHHRA is consistent with that which has been performed for PBOW human health and ecological risk assessments for the past decade, consistent with other FUDS assessments across the country and consistent with RAGS Part A (EPA 1989). PBOW EPC protocol was based on RAGS Part A Chapter 5 Data Evaluation Section which say to use ½ the quantitation limit for non-detect results if there is reason to believe that the chemical present in a sample. Quantitation limit is further defined as the lowest level at which a chemical can be accurately reproducibly quantified. This guidance even recommends that individual samples with elevated RLs be excluded from the quantitative risk assessment.

The ProUCL Version 4.00.05 05 User's Guide (EPA, 2010a) states that the full detection limit should be used rather ½ the detection limit. Section 1.12 of

the ProUCL User's Guide cautions that ProUCL does not make distinctions between MDLs, adjusted MDLs, sample quantitation limits, or instrument detection limits, and that, "It is the user's responsibility to supply correct numerical values (should be entered as reported detection limit value) for ND observations in the data set…" With this responsibility in mind, it must be recognized that the RL is not a detection limit, but is a limit of quantitation, which is defined as the concentration at which an analyte can be reported with a specified degree of accuracy (generally 20 percent, depending on the method). The method detection limit (MDL), however, is a true sample-specific detection limit reported for each sample and analyte. It is defined as the lowest concentration of an analyte that can be distinguished from a blank with 99% certainty. Note that the RL is the MDL multiplied by a factor of 3 to 5; that is, the RL (a limit of quantitation) is 3 to 5 times higher than the MDL (detection limit). The detection limits (i.e., MDLs) are not available for some of the historical data collected prior to 2008, but the RLs are available. Use of ½ the RL is a conservative (i.e., high) estimate of the full detection limit, as ½ the RL is 1.5 to 2.5 times higher than the detection limit.

Further, the use of full RLs as "detection limits" in ProUCL is not desirable because goodness-of-fit tests used in the ProUCL upper confidence limit module are based on all values greater than the highest value identified by the ProUCL user as a "detection limit," as described in Section 4.1 of the ProUCL Version 4.00.05 Technical Guide (EPA, 2010b). For example, a hypothetical data set of n=30 may have 29 detections and a single nondetect characterized by an elevated RL value that is greater than all detected values except for 5 samples. In this case, ProUCL bases the distribution only on the 5 samples that are higher than the elevated RL. This may either limit the selection of UCL methods or may result in the selection of a distribution type that fits the 5 highest detections but is inappropriate for the rest of the sample set (i.e., the other 24 detections). As a result, a UCL value that is nonconservative may be selected because the wrong distribution type was selected by ProUCL based only on the five highest detections. Also, EPA (1989) risk assessment guidance directs that "J-" qualified data should be used to calculate the exposure point concentration based on the reported levels. Because many "J" qualified data are less than the RL (but greater than the MDL), the use of even a single RL for a nondetect result will likely eliminate the inclusion of these "J" values in the distribution fitting. Therefore, use of the RL as the "detection limit" value in ProUCL may lead to distribution testing input that eliminates the consideration of J- qualified data, which is inconsistent with the current EPA (1989) risk assessment guidance practice of assuming that J-qualified data are valid detected values.

References cited in this response:

U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.00.04 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April, EPA/600/R-07/038, April.

U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.00.04 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund***, ***Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002, May.

Comment 3: **SLERA ES. P. 1 L# 31. This document states: "*…additional screening criteria (e.g., comparison with background data…*" For comments, see above: BHHRA comment # 1. Please emphasize that background screening methodology differs from that, currently recommended by OEPA-DERR, and provide justification.**

Response 3: See response to HHRA comment 1.b. Text will be added to ES-1 3rd full paragraph stating that background screening for inorganics differs from OEPA-DERR 2004. In section 2.2.3.3 Background Evaluation 2nd full paragraph, will be expanded with rationale for background inorganic screening, and that the background screening differs from OEPA-DERR 2004. In Section 2.2.3.3 a more detailed description of inorganic background screening will be included. The PBOW Project Delivery Team, including members from the U.S. Army Corps of Engineers (USACE), Nashville and Huntington Districts and their contractors, the National Aeronautics and Space Administration (NASA), and the OEPA have strived to cooperate together for more than a decade. Site-specific team agreements have been made over the years, including how background screening for inorganics. The methodology used for background screening and evaluation in the risk assessment for inorganics was previously requested by OEPA risk assessors for soil in 1999 and was again agreed to by the Project Delivery Team in 2002 for groundwater (Shaw, 2005). It has been used for all PBOW risk assessments conducted since 1999 for consistency from AOC to AOC.

Comment 2: **SLERA S. 2.2.2 P. 2-10 L#14 Also, Tables 2-9 to 2-14. This document states: "*…One-half the reporting limit is used as the ProUCL input concentration for nondetects…*" For comments, see above: BHHRA comment # 2. Please revise the exposure concentrations data (EPCs) calculated with ProUCL software, by using 100% RL as an input for RME modeling at NDs mode.**

Response 2: See HHRA response #2.

Comment 3: **SLERA S.5.1 P. 5-2 L# 3 and S. 6.0 P. 6-1 L.# 11. This document states:**

"*…Thallium was a COPEC in soil at AP 3 and was only detected in 3 out of 16 soil samples (Table 2-12)…*" and then: "*…Thallium was only detected in*

***2 out of 16 samples at concentrations exceeding toxicological and background concentrations…*"**

These two statements may appear contradictory, especially that the Table 2-12 is not detailed enough to relate individual detected concentrations to toxicity values or background levels.
Please harmonize the two statements with Table 2-12.

Response 3: The statements are correct as written, as one refers to the overall detection frequency, and the other refers to the number of detections that exceed screening criteria (in looking at Table 2-12, one can see that the minimum detected thallium concentration of 0.5 mg/kg is below both the BSC and ESV). To clear up any confusion, the statement in section 5.1 will be revised consistent with the following, "Thallium was a COPEC in soil at AP3 and was only detected in 3 out of 16 soil samples, *2 of which exceeded the BSC and ESV* (Table 2-12)."

APPENDIX J

ASH PIT NO. 3 BHHRA ADDENDUM FOR COAL YARD NO. 3

DISCIPLINE SIGN-OFF REVIEW

Shaw Environmental & Infrastructure, Inc.

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 3 BHHRA Addendum for Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 42000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
X	Report	BHHRA Addendum	**Document Status**
☐	Risk Assessment / Evaluation		☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
☐	Other:		☐ Other:

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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 3
Baseline Human Health Risk Assessment Addendum
For Coal Yard No. 3
FUDS No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

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Shaw Project No. 132457

October 2013

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List of Acronyms

ABS	absorption factor
AF	adherence factor
AP1	Ash Pit No. 1
AP3	Ash Pit No. 3
bgs	below ground surface
BHHRA	baseline human health risk assessment
BSC	background screening concentration
CDI	chronic daily intake
cm^2	square centimeter
COPC	chemical of potential concern
CSEM	conceptual site exposure model
D&M	Dames & Moore, Inc.
DA	dose absorbed
DERP	Defense Environmental Restoration Program
DM	dry matter
DNT	dinitrotoluene
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EPC	exposure-point concentration
FUDS	Formerly Used Defense Sites
g	gram
g/kg-day	grams per kilogram per day
g/m^3	grams per cubic meter
GAF	gastrointestinal absorption factor
GSA	General Services Administration
HI	hazard index
HQ	hazard quotient
ICI	International Consultants Incorporated
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
IT	IT Corporation
kg	kilogram
kg/day	kilograms per day
LMS	linearized multistage

List of Acronyms (Continued)

m/second	meters per second
m^3	cubic meter
m^3/day	cubic meters per day
m^3/hour	cubic meters per hour
m^3/kg	cubic meters per kilogram
MDC	maximum detected concentration
µg/m^3	microgram per cubic meter
mg/cm^2	milligrams per square centimeter
mg/cm^2-day	milligrams per square centimeter per day
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
mg/m^3	milligrams per cubic meter
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OEPA	Ohio Environmental Protection Agency
PAH	polycyclic aromatic hydrocarbon
PBOW	Plum Brook Ordnance Works
PDT	Project Delivery Team
PEF	particulate emission factor
RBSC	risk-based screening concentration
RfC	reference concentration
RfD	reference dose
RME	reasonable maximum exposure
RSL	regional screening level
SF	slope factor
Shaw	Shaw Environmental & Infrastructure, Inc.
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
UCL	upper confidence limit
UF	uncertainty factor
USACE	U.S. Army Corps of Engineers

VOC	volatile organic compound
WRS	Wilcoxon Rank Sum

Executive Summary

A baseline human health risk assessment (BHHRA) addendum was conducted to evaluate risks associated with exposure to surface soil and subsurface soil at the coal yard associated with Ash Pit No. 3 (AP3), located at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. This coal yard site is referred to as "Coal Yard No. 3." This BHHRA is an addendum to the AP3 BHHRA. The approach used in the BHHRA addendum is consistent with methodologies described in the U.S. Environmental Protection Agency's primary risk assessment guidance documents, the site-specific work plan, and discussions and agreements among the Ohio Environmental Protection Agency, the U.S. Army Corps of Engineers Nashville and Huntington Districts, and Shaw Environmental & Infrastructure, Inc. (a CB&I company).

Site History/Description. The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene, and pentolite. Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the Plum Brook Depot, also known as the Magazine Area, which comprises 2,800 acres. The Department of the Army reacquired the 3,230 acres in 1954 and performed cleanup efforts from the mid-1950s until 1963.

Accountability and custody for the entire portion of the former PBOW property that had been under the accountability and custody of the Department of the Army were transferred to the National Aeronautics and Space Administration (NASA) on March 15, 1963. NASA performed further decontamination efforts during 1964. NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of the John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status.

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the TNT manufacturing processes. Coal Yard No. 3 was used as a storage area to provide coal for the Powerhouse No. 3 boilers. The coal was brought into the

coal yard via train. The generated steam was used for space heating, driving compressors, and generating electrical power. Coal Yard No. 3 is located immediately to the south of Powerhouse No. 3 and immediately east of Ash Pit No. 3. The former coal yard is estimated to have been approximately 200 feet by 210 feet, or approximately 1 acre. The former Powerhouse No. 3 building has been used by NASA for various purposes. It is currently scheduled for demolition in 2013. The former coal yard is currently covered with grass and brush vegetation.

Approach. The BHHRA addendum evaluated exposure to chemicals in Coal Yard No. 3 surface soil and subsurface soil. Validated analytical data are from samples collected during 2011, as reported in the site characterization report. Please note that groundwater in the vicinity was evaluated in the AP3 BHHRA.

The standard steps of risk assessment, including data analysis, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis were executed in the Coal Yard No. 3 BHHRA addendum. A screening for chemicals of potential concern (COPC) was used to focus the evaluation on those chemicals most likely to present a risk to potentially exposed individuals. This screening included a risk-based screening and, for inorganics in soil, a background screening. This background screening protocol, which is based on PBOW Project Delivery Team agreement, differs somewhat from the current Ohio Environmental Protection Agency guidance. Use of this method for the screening of background ensures consistency between all of the PBOW project sites.

Each COPC in each medium was evaluated for exposure via the relevant exposure pathways, and the resultant risk and hazards were estimated. The receptors listed below were evaluated for exposure to the COPCs and their associated hazards and risks. The media evaluated for each receptor are shown in parentheses.

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only])
- Current/future construction worker (total soil)
- Hypothetical future resident (total soil)
- Future adult hunter (surface soil, including venison pathway)
- Future hunter’s child (surface soil [venison pathway only]).

None of the COPCs have recognized noncancer effects. Therefore, the noncancer hazards of Coal Yard No. 3 soil are regarded as negligible for all receptors. The overall incremental lifetime cancer risk (ILCR) values are summarized in the following bullets:

- Current groundskeeper: ILCR = 3E-6.
- Future groundskeeper: ILCR = 3E-6.
- Future indoor worker: ILCR = 8E-7.
- Construction worker: ILCR = 1E-7.
- Hypothetical future resident: ILCR = 9E-6.
- Future hunter: ILCR = 2E-7.
- Future hunter's child: None of the carcinogenic COPCs are bioaccumulative; cancer risks are assumed to be de minimis.

No construction is currently planned at Coal Yard No. 3, and no groundskeeping of any sort appears to be occurring at Coal Yard No. 3. Therefore, the current groundskeeper, which assumes a full-time, 25-year employee who works exclusively at Coal Yard No. 3 for 250 days per year, represents an extreme overestimate of exposure to any current receptor. Each of the future scenarios are hypothetical and likely conservative.

The ILCR values for each of the Coal Yard No. 3 soil exposure scenarios are within or less than the National Oil and Hazardous Substances Pollution Contingency Plan cancer risk management range of 1E-6 to 1E-4 and all are less than the PBOW cancer risk goal of 1E-5. None of the COPCs have recognized noncancer effects. Therefore, the noncancer hazards associated with exposure to site-related chemicals in Coal Yard No. 3 soil are regarded as negligible.

1.0 Introduction

This baseline human health risk assessment (BHHRA) addendum evaluates potential human health risks associated with exposure to soil at the Powerhouse No. 3 Coal Yard (Coal Yard No. 3), which is located at the former Plum Brook Ordnance Works (PBOW), Sandusky, Erie County, Ohio. This site is administered as part of Defense Environmental Restoration Program (DERP)-Formerly Used Defense Sites (FUDS) Project No. G05OH001821, Ash Pit No. 1 (AP1) and Ash Pit No. 3 (AP3). This work is being conducted by Shaw Environmental & Infrastructure, Inc. (Shaw) (a CB&I company) for the U.S. Army Corps of Engineers (USACE) under the DERP- FUDS, managed by the USACE Huntington District, and technically overseen by the USACE Nashville District. This addendum to the AP3 BHHRA (Shaw, 2013a) is consistent with U.S. Environmental Protection Agency (EPA) guidance and with the procedures established in the BHHRA for TNT Area A (TNTA) and TNT Area C (TNTC) soil (IT Corporation [IT], 2001) and, most specifically, the AP1 and AP3 BHHRA work plan (Shaw, 2009).

1.1 Facility Location and Description

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitroluene (DNT), and pentolite (International Consultants Incorporated [ICI], 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNTA, TNT Area B (TNTB), and TNTC. Twelve process lines were used in the manufacture of TNT: four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the Army in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After the property was certified as decontaminated, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration. In 1949, PBOW was transferred to the General Services Administration (GSA). This transfer did not include the 2,800-acre Plum Brook Depot area, which is also known as the Magazine Area. The Department of the Army reacquired the 3,230 acres in 1954. In 1955, the Army completed further decontamination of the manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds. The Army continued cleanup efforts until 1963.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; then removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were covered with fill material. All materials, including the soil in those areas, were flashed; the area was then rough-graded. The decontamination process was also to have included the burning of excavated nitroaromatic-filled flumes (Dames & Moore, Inc. [D&M], 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a satellite research facility in support of the John H. Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the site are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. This excess included former buffer areas that had not been used by the Army and thus were not subject to decontamination efforts. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The GSA retains ownership of the remaining excess acreage and currently has a use agreement

with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the site management plan (ICI, 1995).

1.3 Coal Yard No. 3 Site Description and History

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the TNT manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. The coal yards were used as storage areas to provide coal for the powerhouse boilers. The coal was brought into the yards via train. Figure 1-2 shows the locations of Coal Yard No. 3 and other investigative sites on PBOW property.

Former Coal Yard No. 3 is located immediately to the south of Powerhouse No. 3 and immediately east of AP3. The historical former coal yard is estimated to have been approximately 200 feet wide by 210 feet in length (approximately 1 acre). All coal besides that which has settled into the ground surface has been removed. The coal removal date is unknown. Most of the area is currently covered with grass; however, approximately the western third of the former coal yard is a paved area. Since acquisition of PBOW property by NASA in 1963, former Powerhouse No. 3 has been used for various purposes. Powerhouse No. 3 is planned for demolition by NASA in 2013. No permanent or semipermanent water bodies are present at this site.

No previous environmental investigation has been conducted at Coal Yard No. 3.

1.4 Site Use

Current use of the PBOW facility is classified as industrial for the purpose of identifying plausible human receptors and exposure pathways for evaluation in the BHHRA. D&M (1997) describes potential future uses of all or portions of the facility as follows:

- Industrial use (NASA activities and programs) may continue.
- Portions of the site may be used for recreation by hunters and fishermen.

- Portions of the site may be sold to state or local government or private individuals (no land-use restrictions were mentioned).
- Parts of the facility may be used in the future for residential or agricultural purposes.
- Parts of the facility may be used for training by the National Guard.
- Construction activities may be performed during development of any of the sites.

In summary, future site uses of Coal Yard No. 3 are considered to be industrial or residential for the purpose of developing receptor and exposure scenarios. There are no current NASA activities at Coal Yard No. 3, but because PBOW is under NASA control, the potential for NASA activities at Coal Yard No. 3 exists. Even though hunting is not currently permitted at Coal Yard No. 3, hunting is permitted in other areas within PBOW; therefore, future use of Coal Yard No. 3 for hunting is evaluated in this BHHRA. Section 3.1.3 presents a discussion of receptors and exposure scenarios.

1.5 Protocol for the Baseline Human Health Risk Assessment

The BHHRA addendum was performed consistent with the AP1 and AP3 BHHRA work plan (Shaw, 2009). The AP1 and AP3 BHHRA work plan was developed consistent with previous PBOW BHHRAs and is based on EPA, USACE, and Ohio Environmental Protection Agency (OEPA) guidance, including, but not limited to, the following:

- Ohio Environmental Protection Agency (OEPA), 2009a***, Use of U.S. EPA's Regional Screening Levels as Screening Values in Human Health Risk Assessments***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.
- Ohio Environmental Protection Agency (OEPA), 2009b***, Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for the DERR Remedial Response Program***, Technical Decision Compendium, Division of Emergency and Remedial Response, August.
- U.S. Army Corps of Engineers (USACE), 1999, ***Risk Assessment Handbook, Volume I: Human Health Evaluation***, Engineer Manual EM 200-1-4.
- U.S. Environmental Protection Agency (EPA), 1989a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.
- U.S. Environmental Protection Agency (EPA), 1991, ***Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors***, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

- U.S. Environmental Protection Agency (EPA), 1992, ***Guidance on Risk Characterization for Risk Managers and Risk Assessors***, Memorandum from F. Henry Habicht II, Deputy Administrator, to Assistant Administrators, Regional Administrators, February.

- U.S. Environmental Protection Agency (EPA), 1997a, ***Exposure Factors Handbook***, Office of Research and Development, National Center for Environmental Assessment, Washington, D.C., EPA/600/P-95/002Fa, August.

- U.S. Environmental Protection Agency (EPA), 2002, ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites***, Office of Solid Waste and Emergency Response, Washington, D.C., 9355.4-24, December.

- U.S. Environmental Protection Agency (EPA), 2004a, ***Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)***, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

- U.S. Environmental Protection Agency (EPA), 2010a, ***ProUCL Version 4.1 Technical Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/041, May.

- U.S. Environmental Protection Agency (EPA), 2010b, ***ProUCL Version 4.1 User Guide***, Draft, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, EPA/600/R-07/038, May.

- U.S. Environmental Protection Agency (EPA), 2011, ***ProUCL Version 4.1***, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, February, on line at http://www.epa.gov/esd/tsc/form.htm.

1.6 Report Organization

The remainder of this document is organized as follows:

- ***Chapter 2.0, Data Evaluation.*** Identifies data sources, evaluates data quality, identifies chemicals of potential concern (COPC), and provides a background screening and evaluation protocol. It is noted that the background screening protocol differs from the current OEPA (2009c) guidance, as explained in Section 2.4.3.

- ***Chapter 3.0, Exposure Assessment.*** Presents a conceptual site exposure model (CSEM), including contaminant sources, contaminant release mechanisms, receptors, and exposure pathways; describes exposure-point concentrations (EPC); and presents methods for calculating chemical intake and contact rates.

- ***Chapter 4.0, Toxicity Evaluation.*** Describes the potential for cancer and/or noncancer human health effects, provides an estimate of the quantitative relationship

between the magnitude of dose or contact rate and the probability and/or severity of adverse effects, identifies the toxicity values that are used in the BHHRA, and describes the development of dermal toxicity values.

- ***Chapter 5.0, Risk Characterization.*** Combines the output of the exposure assessment and toxicity assessment to quantify the risk to each receptor at Coal Yard No. 3. Risks associated with exposure to all appropriate Coal Yard No. 3 media are evaluated.

- ***Chapter 6.0, Uncertainty Analysis.*** Identifies uncertainties in all phases of the BHHRA and discusses their individual effects on the risk assessment results, focusing on those issues that are most likely to have the greatest effect on risk estimates and/or risk management decisions.

- ***Chapter 7.0, Summary and Conclusions.*** Provides a brief summary of the BHHRA, including quantitative results, uncertainties, and pertinent site information. Summary and discussion is focused on those results and issues that are most directly relevant to the risk assessment conclusions for Coal Yard No. 3 that are likely to directly affect site management decisions.

- ***Chapter 8.0, References.*** Presents the references used in the preparation of this document.

2.0 Data Evaluation

Data evaluation consists of a description of the appropriate data sources for Coal Yard No. 3 soil, a discussion of data quality, a description of the methodology used for identification of the COPCs, and a summary of the COPCs.

2.1 Data Sources

All soil samples from which the validated analytical data used in the BHHRA addendum were derived are presented in Table 2-1. The sample summary table identifies each sample used in the BHHRA addendum and the associated analytical suite, which are those collected as part of the remedial investigation in 2011 and described in the Coal Yard No. 3 site characterization report (Shaw, 2013b). All Coal Yard No. 3 sampling locations are shown on Figure 2-1.

2.2 Organization of the Analytical Data

Prior to initiation of BHHRA calculations, a database of chemicals present in site soil samples was compiled. This database includes all chemicals detected as described in the site characterization report (Shaw, 2013b). The surface soil and subsurface soil are considered separate media. Surface and subsurface soil data are typically combined to assess exposures under the construction worker, future groundskeeper, and hypothetical future residential site-use scenarios, which would likely occur after surface and subsurface soil had been excavated and/or mixed, assuming that COPCs are identified for surface and/or subsurface soil in the BHHRA addendum. Combined surface and subsurface soil data are referred to as “total soil” in the BHHRA. If a chemical is either a surface soil COPC or a subsurface soil COPC (or both), then that chemical is a total soil COPC.

Generally, surface soil is defined as samples collected from within the interval of 0 to 1 foot below ground surface (bgs), and subsurface soil is defined as samples collected from depths greater than 1 foot bgs per the coal yard sampling and analysis plan (Shaw, 2011). Coal Yard No. 3 surface soil samples were collected immediately below a layer of fill rock that was used as the base for coal storage; this layer was found to be 0.2 to 1.5 foot thick. Subsurface soil samples were collected from the 3-to-5-foot and 8-to-10-foot bgs intervals.

2.3 Evaluation of Data Quality

The quality of the analytical data was evaluated to select data for inclusion in the BHHRA addendum. Data quality is expressed by the assignment of qualifier codes during the analytical

laboratory quality control process or during third-party data evaluation. Some of the more common qualifiers and their meanings are as follows (EPA, 1989a):

U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.

J - Value is estimated, usually below the reporting limit.

N - The analysis indicates an analyte for which there is presumptive evidence to make a tentative identification.

NJ - The analysis indicates a "tentatively identified analyte," and the reported value represents its approximate concentration.

UJ - The analyte was not detected above the reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - Quality control indicates that the data are unusable (chemical may or may not be present).

B - The concentration in the sample is not sufficiently higher than the concentration in the blank, using the 5-times, 10-times rule, which states that a chemical is considered a nondetect unless its concentration exceeds 5 times the blank concentration. For common laboratory contaminants (acetone, 2-butanone [methyl ethyl ketone], methylene chloride, toluene, and the phthalate esters), the sample concentration must exceed 10 times the blank concentration to be considered a detection.

"J," "N," and "NJ" qualified data are treated in the BHHRA addendum as detected concentrations; "R" data and "B" qualified chemical data are not used. "U" qualified data (nondetects) are treated in the BHHRA addendum as nondetections. The use of data with other, less common qualifiers is evaluated on a case-by-case basis. Generally, data for which the identity of the chemical is unclear are not used in the BHHRA. If confidence is reasonably high that the chemical is present but the actual concentration is somewhat in question, the data generally are used in the BHHRA.

Some chemicals may be analyzed under two different analytical programs. For example, the DNT isomers are analyzed by EPA Method 8330 for nitroaromatics as well as EPA Method 8270C for semivolatile organic compounds. As appropriate, risks associated with the reported values from both analyses are typically considered in the risk characterization and may be discussed as appropriate in the uncertainty analysis, together with potential issues such as the

relative sensitivities (i.e., differences in respective reporting limits) of the methods. The data used in the BHHRA are included as Appendix A.

2.4 Identification of Chemicals of Potential Concern

A screening process is used to identify COPCs, which are the detected chemical analytes carried through the full risk assessment process. The objectives of COPC screening are to focus the risk assessment on those chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. COPC screening includes a risk-based screen that also considers status as a human nutrient (Section 2.4.1), a frequency-of-detection evaluation (Section 2.4.2), and a background screen (Section 2.4.3).

2.4.1 Risk-Based Screening

In the risk-based screen, the maximum detected concentration (MDC) of a chemical in a given medium is compared to the appropriate risk-based screening concentration (RBSC) for that chemical and medium. This is performed for each chemical in each medium. The units of the MDC and RBSC are the same for each chemical in a given medium. For Coal Yard No. 3, only soil was evaluated; therefore, all MDCs and RBSCs are in units of milligrams per kilogram (mg/kg).

If the MDC of a chemical is less than or equal to its RBSC, then the chemical is not considered further in the BHHRA for this medium because it is very unlikely that chemical concentrations at or below the RBSC would contribute substantially to risk. Where no COPCs for an environmental medium are identified, that medium is not quantitatively evaluated in the BHHRA. An analyte may be identified as a COPC if its MDC exceeds its RBSC. As indicated in Section 2.4, actual status as a COPC also depends on a chemical's frequency of detection (Section 2.4.2), concentration with respect to background (Section 2.4.3), and potential status as a nutrient. RBSCs for both surface and subsurface soil are derived from EPA regional screening level (RSL) "residential soil" values (EPA, 2012a). This is a change in the source of the RBSCs for PBOW BHHRA work plans begun prior to March 2009. This change is based on discussion between USACE and OEPA (2009c) and is consistent with current OEPA (2009a) guidelines. Previously, the RBSCs were derived from the EPA (2004b) Region 9 preliminary remediation goals.

RSL values are based on a concentration equal to either an incremental lifetime cancer risk (ILCR) of 1E-6 or a noncancer hazard quotient (HQ) of 1, the threshold at (or below) which adverse noncancer effects are regarded as unlikely to occur. For the BHHRA, the noncancer

values listed in the RSL tables are multiplied by a factor of 0.1 to provide additional protection for simultaneous exposure to multiple chemicals (OEPA, 2009a; EPA, 2012a). This results in RBSC values associated with an HQ of 0.1. For cancer risk, the RSL values based on an ILCR of 1E-6 were used directly as RBSCs in the BHHRA. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) identifies acceptable exposure levels that are generally associated with concentration levels that represent an excess upper bound lifetime cancer risk to an individual of 1E-6 to 1E-4 (EPA, 1990). This range is hereinafter referred to as the "NCP risk management range." Cancer risks associated with RSL values represent the lower end of this range. OEPA recognizes an overall cancer risk of 1E-5, which represents the logarithmic midpoint of the EPA risk management range, as a remedial goal (OEPA, 2009b). The RBSC for a chemical that elicits both cancer and noncancer health effects is selected based on either a cancer risk of 1E-6 or an HQ of 0.1, whichever associated concentration is lower.

The screening of lead in soil is a special case. Lead exposure and risk are evaluated separately from other chemicals using the EPA (2004c) Integrated Exposure Uptake Biokinetic (IEUBK) model. This IEUBK model includes cumulative lead exposure from multiple media, primarily soil and drinking water exposure. The residential RSL for lead in soil is 400 mg/kg, which is used in the BHHRA as the RBSC. The selection of the action level for lead in drinking water (EPA, 2012b) as the drinking water RSL is based partly on the IEUBK model. Section 5.2 of the RSL user's guide (EPA, 2012c) states that if the average tap water concentration exceeds 15 micrograms per liter and the average soil concentration exceeds 250 mg/kg, then more than the IEUBK target (EPA, 2004c) of 5 percent of the population of exposed children may exceed 10 micrograms per deciliter of lead in blood. It is possible that the residential soil RSL of 400 mg/kg, which is selected as the soil RBSC, may not be protective of an average soil concentration of 250 mg/kg within a given data set. Therefore, the following conditions were placed on the screening of lead: 1) If either the soil RBSC or the drinking water action level for lead is exceeded, then the IEUBK blood-lead model is run using both average soil and groundwater concentrations; and 2) if the average soil concentration exceeds 250 mg/kg, then the IEUBK model is run, even if neither the soil RBSC nor the drinking water action level is exceeded, using average concentrations of lead in both soil and groundwater.

For Coal Yard No. 3 soil, the MDCs for lead in surface soil (11.0 mg/kg) and subsurface soil (12.8 mg/kg) are both less than the RBSC (400 mg/kg) and the criterion for average concentration (250 mg/kg). Although groundwater is not evaluated specifically in this BHHRA addendum, lead was not detected in AP3 groundwater, which should be representative of groundwater in the vicinity of Coal Yard No. 3 (Shaw, 2013b). Therefore, the IEUBK model was not run.

The evaluation of essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required human nutrients. Essential nutrients such as calcium, chloride, iodine, magnesium, phosphorus, potassium, and sodium are generally considered innocuous at levels found in environmental media. No RSLs are listed for these nutrients. Should any of these chemicals be identified as site related, an exposure analysis is performed whereby a daily dose of chemical from ingestion of the medium in question is calculated. The dose is compared with levels known or expected to be safe or toxic and/or with recommended daily allowances, depending on the availability of data.

2.4.2 Frequency of Detection

When confidence is high that a given chemical is present, the data generally are used in the BHHRA. For most chemicals, their detection is presumptive evidence of their presence. As suggested by EPA (1989a), chemicals that are reported infrequently may be artifacts in the data that do not reflect the actual presence of the chemical in question. For the BHHRA, chemicals that are reported only at low concentrations in less than 5 percent of the samples from a given medium are excluded from further consideration, unless the presence of a given chemical is expected based on historical information about the site. Chemicals detected infrequently at high concentrations may identify the existence of limited contaminant “hot spots” and are retained as COPCs. Please note that for Coal Yard No. 3, all data sets have less than 20 samples. Therefore, if a chemical was detected even once, it was not screened out based on infrequent detection.

2.4.3 Comparison to Background

A number of the chemicals detected in PBOW soils may have MDCs that exceed RBSCs but are part of normal background concentrations. Such chemicals may include inorganics and polycyclic aromatic hydrocarbons (PAH), a class of organic compounds that form from natural or anthropogenic combustion of organic matter, including fossil fuels, and are generally ubiquitous in the environment. Airborne PAHs associated with non-U.S. Department of Defense sources may be deposited on soil.

Concentrations of inorganic chemicals in site environmental media may be compared to those of PBOW background using a two-step approach: 1) background screening and 2) statistical data set testing. This second step (Section 2.4.3.2) is initiated only in cases where the concentration used for background screening is exceeded (Section 2.4.3.1) and is performed after the risk characterization. The results of the statistical data testing are discussed in the uncertainty analysis (Chapter 6.0).

Inorganics and organics are treated similarly from a quantitative perspective. However, all organics not eliminated on the basis of RBSC exceedance (Section 2.4.1) or infrequent detection (Section 2.4.2) are carried through the risk calculation process (exposure assessment, toxicity assessment, and risk characterization). As presented in Section 2.4.3.3, organic compounds are quantitatively eliminated as background related only through the uncertainty analysis if applicable.

2.4.3.1 Background Screening of Inorganics

Background screening is applied to each inorganic that has an MDC in soil exceeding the RBSC and that cannot be characterized as an infrequently detected analyte. In background screening, the MDC is compared to the PBOW chemical-specific background screening concentration (BSC). The background data set and derivation of soil BSCs for all PBOW soil investigations are presented in the site investigation for the acid areas (IT, 1998). It is noted that the method agreed upon for the development of BSCs, as recorded in the May 10, 2000 PBOW Project Delivery Team (PDT) meeting minutes (PBOW PDT, 2000), differs from that shown in current OEPA (2009d) guidance. Use of this PBOW PDT method for the development of BSCs and as part of the COPC screening process ensures consistency among all of the PBOW FUDS project sites. A summary table of the background soil data set is provided as Table 2-2. The background soil samples were collected from near the property boundary, away from any potential source areas. Briefly, BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (IT, 1998; PBOW PDT, 2000).

The background screening consists of comparing the MDC of the site soil data set to the BSC. The chemical may be regarded as a COPC if its MDC exceeds the BSC for that chemical or if no BSC can be determined due to a lack of detections in the background data set. COPCs are fully evaluated in the exposure assessment, toxicity assessment, and risk characterization. An inorganic analyte is not regarded as a COPC if its MDC is equal to or less than the BSC.

2.4.3.2 Statistical Data Set Testing of Inorganics

Statistical testing is performed to compare site inorganics data against the appropriate PBOW background data sets. The background data set for soil is described in Section 2.4.3.1 and presented in the site investigation for the acid areas (IT, 1998). The method for statistical comparison of the site data sets to the background data sets, described in Appendix M of the 2004 groundwater data summary and evaluation report (Shaw, 2005), is the Wilcoxon Rank Sum (WRS) statistical test (also known as the Mann-Whitney U test). WRS testing is performed for

inorganics having MDCs that exceed the respective BSCs and are identified as COPCs based on RBSC comparison (Section 2.4.1) and frequency of detection (Section 2.4.2). All COPCs are carried through the risk characterization process; thus, statistical testing results are not used to screen out any chemicals. WRS testing is used only to evaluate inorganic COPCs and is not used to evaluate non-COPC inorganics.

2.4.3.3 Treatment of Organic Compounds

Certain organic compounds (e.g., PAHs) in site media may be attributable to background conditions. However, no organic compounds are summarily screened out. Instead, all detected organic compounds are carried through the risk assessment process (i.e., exposure assessment, toxicity assessment, risk characterization) unless screened out on the basis of comparison to RBSCs (Section 2.4.1) or characterized as infrequently detected (Section 2.4.2). Background contributions of organics are discussed in the uncertainty analysis, as applicable.

2.5 Data Evaluation Summary

Data summary tables are provided for Coal Yard No. 3 surface soil (Table 2-3), subsurface soil (Table 2-4), and total soil (Table 2-5) These tables provide the following information for each detected chemical, as applicable:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of reporting limits
- Arithmetic mean of site concentrations
- Appropriate BSC
- Appropriate RBSC
- Selection/exclusion of chemical as a COPC
- 95th percent upper confidence limit (UCL) on the arithmetic mean (for COPCs only)
- EPC (for COPCs only).

The COPCs for each of the Coal Yard No. 3 media are identified as follows:

- ***Surface Soil*** – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene

- ***Subsurface Soil*** – None

- ***Total Soil*** – Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene.

As discussed in Section 2.2, the total soil COPCs include all surface soil and subsurface soil COPCs. The fact that no COPCs were found in subsurface soil indicates that the subsurface soil is unimpacted by former site operations and does not represent any human health risks or hazard beyond that of background conditions. Therefore, the EPCs for surface soil were used in the exposure assessment (Chapter 3.0) to represent total soil for the future groundskeeper, construction worker, and hypothetical future resident. This is a conservative assumption because it assumes no mixing with uncontaminated subsurface soil would occur during future land development activities. Please note that UCL values for total soil are provided in Table 2-5 as additional information to consider for the uncertainty analysis (Section 6.2.3). These UCL values may be considered as alternative EPC values in an uncertainties analysis to represent total soil.

3.0 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989a). An exposure assessment includes the following steps:

- Characterize the physical setting.
- Identify the contaminant sources, release mechanisms, and migration pathways.
- Identify the potentially exposed receptors.
- Identify the potential exposure pathways.
- Estimate exposure concentrations.
- Estimate chemical intakes or contact rates.

The BHHRA characterizes potential exposures to COPCs in Coal Yard No. 3 environmental media as portrayed by the CSEM in Section 3.1. Note that the environmental media on Figure 3-1 include soil and groundwater, but that groundwater in the area of Coal Yard No. 3 was evaluated as part of the AP3 BHHRA (Shaw, 2013a). No surface water bodies or drainage ditches into which surface drainage may collect and/or flow are present in Coal Yard No. 3. Therefore, only soil was evaluated in this BHHRA addendum.

3.1 Conceptual Site Exposure Model

The CSEM provides the basis for identifying and evaluating the potential risks to human health in the BHHRA. The CSEM, graphically depicted on Figure 3-1, includes the receptors appropriate to all plausible site-use scenarios and the potential exposure pathways. This presentation of all possible pathways by which a potential receptor may be exposed, including all sources, release and transport pathways, and exposure routes, facilitates consistent and comprehensive evaluation of risk to human health and helps to ensure that potential pathways are not overlooked. The elements of a CSEM include the following:

- Source
- Source media (i.e., initially contaminated environmental media)
- Contaminant release mechanisms
- Contaminant transport pathways
- Intermediate or transport media
- Exposure media
- Receptors
- Routes of exposure.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium (e.g., ingestion or dermal contact).

The receptors and pathways on Figure 3-1 reflect scenarios developed from information regarding site background and history, topography, climate, and demographics as presented by D&M (1997) and the sitewide groundwater investigation (IT, 1997). On Figure 3-1, asterisks identify exposure pathways that are complete and addressed in this BHHRA. Justification for exclusion of other pathways is provided in the Figure 3-1 footnotes, and the exclusion of other potential receptors is discussed in Section 3.1.3.8. It is important to note that the site-specific risk assessment, including the evaluation of future land uses, was performed to satisfy administrative requirements, including those described by FUDS regulations (USACE, 2004).

3.1.1 Physical Setting

Coal Yard No. 3 is located just south of the former NASA K-Site Test Facility research building (former Powerhouse 3) (Figure 1-2). Operations at the K-Site were officially abandoned in 2007, and the building is scheduled by NASA for demolition in 2013. Most of Coal Yard No. 3 is covered in grasses, and approximately the western third is paved. No surface water features or drainage ditches are present. A general description of Coal Yard No. 3 is presented in Section 1.3.

Please see Section 3.1.1.1 of the AP3 BHHRA (Shaw, 2013a) for information including the climate and meteorology of the Sandusky region and the geology (Section 3.1.1.2), soil (Section 3.1.1.3), and hydrology (Section 3.1.1.4) associated with the vicinity of AP3. Although no wells were advanced through the shale and limestone bedrock at Coal Yard No. 3, the site-specific information on AP3 geology and hydrology is likely representative of Coal Yard No. 3 as well.

3.1.2 Contaminant Sources, Release Mechanisms, and Migration Pathways

Contaminant sources, release mechanisms, and migration pathways are summarized on Figure 3-1. Leaching and downward migration may have carried contaminants in the coal materials to the underlying soils, and from the subsurface soil to the groundwater underlying Coal Yard No. 3. As mentioned in Section 3.1.1, groundwater in the area was evaluated in the AP3 BHHRA (Shaw, 2013a).

3.1.3 Receptors and Exposure Pathways

Receptors selected to represent the upper bound on exposure from all plausibly exposed groups of people associated with Coal Yard No. 3 as well as the pathways by which they may be exposed to chemicals are summarized on Figure 3-1 and in Table 3-1. The exposure variable values used in the contaminant intake models are compiled in Table 3-2. The receptors evaluated in the BHHRA are listed below. Note that the current (Section 3.1.3.1) and future (Section

3.1.3.2) groundskeeper scenarios include different environmental media and are, thus, listed separately. The construction worker may be viable under current or future land use. However, the evaluation for this receptor is exactly the same under current and future land use.

- Current groundskeeper
- Future groundskeeper
- Future indoor worker
- Current/future construction worker
- Hypothetical future on-site resident
- Future hunter
- Future hunter's child.

Most BHHRAs are based on a reasonable maximum exposure (RME) assumption. The intent of the RME assumption is to estimate the highest exposure level that could reasonably be expected to occur, but not necessarily the worst possible case (EPA, 1989a; 1991). It is interpreted as reflecting the upper 90 to 95th percentile on exposure. In keeping with EPA (1989a; 1991) guidance, variables chosen for a baseline RME scenario for ingestion rate, exposure frequency, and exposure duration are generally upper bounds. Other variables, such as body weight and exposed skin surface area, are generally central or average values. In the case of contact rates consisting of multiple components, e.g., dermal contact with soil, which consists of a dermal absorption factor (ABS) and soil-to-skin adherence factor (AF) for soil, only one variable, ABS, needs to be an upper bound. The conservativeness built into the individual variables ensures that the entire estimate for contact rate is sufficiently conservative.

The averaging time for noncancer evaluation is computed as the product of the exposure duration (years) multiplied by 365 days per year. The resultant noncancer averaging time is used to estimate an average daily dose over the entire exposure period (EPA, 1989a). For cancer evaluation, the averaging time is computed as the product of 70 years, the assumed human lifetime, times 365 days/year. This cancer-based averaging time is used to estimate an average daily dose prorated over a lifetime, regardless of the frequency or duration of exposure. The methodology used in deriving the averaging time for cancer risks assumes that the risk from short-term exposure to a high dose of a given carcinogen is equivalent to long-term exposure to a correspondingly lower dose, provided that the total lifetime doses are equivalent. This approach is generally consistent with the EPA (2005) policy of carcinogen evaluation, although it introduces considerable uncertainty into the BHHRA cancer risk estimates.

Receptors and the associated exposure pathways are presented in the following subsections. Please note that some of the pathways considered for the receptors (e.g., volatile organic

compounds [VOC] in soil) could not be quantitatively evaluated because pertinent chemicals associated with these pathways were not identified as COPCs.

3.1.3.1 Current Groundskeeper

The groundskeeper scenario is designed to evaluate the upper bound for long-term site worker exposure to surface soil in the current site use scenario and total soil in the future site-use scenario. It is noted that no groundskeeper is currently working at the site, but current land use does not prohibit a site worker from performing groundskeeping activities at the site.

Exposure to surface soil is evaluated for a (potential) current groundskeeper. Total soil is typically evaluated under the future groundskeeper use scenario because hypothetical future construction may include considerable excavation of subsurface soil. This soil may be spread on the surface and regraded such that some of the soil currently in the subsurface (typically assumed to be 1 to 10 feet bgs) will be spread as surface soil (0 to 1 foot bgs).

Direct soil exposure pathways include incidental ingestion and dermal contact. Inhalation of dust raised by lawnmowers or other equipment is also evaluated because relatively high dust concentrations may be produced within the groundskeeper's breathing zone, with little opportunity for dilution by the large volume of ambient air.

Surface soil that is contaminated with VOCs and that has been in place for extended periods is not a significant source of airborne VOCs, because infiltration and dissipation over time reduces residues at the surface (i.e., the first few centimeters) from which volatilization would occur. However, as noted above, the data set for surface soil may include samples taken from up to 1 foot bgs, which would include the soil zone deeper than the top few centimeters, where dissipation has not reduced VOC concentrations. In other words, the surface soil data set might indicate the presence of VOCs, although volatilization to the air is unlikely to be significant. Therefore, a surface soil-to-air volatilization model is not used in addition to the activity-based dust emissions model to estimate airborne concentrations of VOCs. Instead, the airborne concentrations estimated by the dust emissions model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust emissions model treats the VOCs as if they were located at the surface. It is assumed that VOC emissions from subsurface soil (i.e., at depths greater than 1 foot bgs) would be attenuated by the overlying soil so that concentrations in ambient air would not be toxicologically significant.

The groundskeeper is assumed to be a 70-kilogram (kg) adult who works 8 hours per day, approximately 5 days per week year-round on site for a total of 250 days/year for 25 years (EPA,

2004a). The respiratory rate for the groundskeeper is assumed to be 20 cubic meters (m^3) per 8-hour workday or 2.5 cubic meters per hour (m^3/hr) (EPA, 1991), and the soil incidental ingestion rate is assumed to be 100 milligrams per day (mg/day) (EPA, 2002). The groundskeeper is assumed to be exposed dermally to soil. An exposed skin surface area of 3,300 square centimeters (cm^2) and a soil AF of 0.2 milligrams per square centimeter (mg/cm^2) are assumed (EPA, 2004a).

3.1.3.2 Future Groundskeeper

A future groundskeeper would be exposed to soil via the same exposure pathways as the current groundskeeper described in Section 3.1.3.1. However, the future groundskeeper scenario assumes that construction has taken place and that some of the soil currently in the subsurface has been brought to the surface during earthmoving activities. Therefore, the future groundskeeper is assumed to be exposed to a combination of surface and subsurface soil (total soil) rather than surface soil alone. As described in Section 2.5, surface soil EPCs were conservatively used to represent total soil for Coal Yard No. 3 because no COPCs were identified for subsurface soil.

3.1.3.3 Future Indoor Worker

This hypothetical future receptor scenario was used to evaluate exposure to indoor airborne VOCs entrapped in a building. VOCs released from subsurface soil may enter a building through joints or cracks in the foundation or slab. The indoor worker is also potentially exposed to surface soil via incidental ingestion. Exposure to COPCs in surface soil via dermal contact and inhalation of airborne dust and VOCs from surface soil, although plausible, are expected to be less significant than incidental ingestion, because this receptor spends his/her work time indoors. Therefore, dermal contact and inhalation of dust and airborne VOCs from surface soil are not quantified separately from ingestion exposure (EPA, 2002). Under a future use scenario for this receptor, construction of a building would be necessary. This would require excavation and regrading of soil. Normally, when construction is involved, such as for the future groundskeeper or resident, total soil rather than surface soil would be evaluated for ingestion exposure. However, the chief purpose of this receptor is to evaluate exposure via vapor intrusion of contaminants from subsurface soil into indoor air. Thus, the evaluation of direct contact with subsurface soil as a component of total soil would equate to “double counting” of COPCs in subsurface soil. Also, the groundskeeper reflects a worst-case exposure for a long-term worker with respect to direct contact with both surface soil and total soil. Therefore, direct contact with surface soil for the indoor worker is included to reflect a more complete exposure scenario, but direct contact with subsurface soil is most effectively addressed from an RME perspective by the groundskeeper.

The indoor worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week year-round on the site for a total of 250 days/year for 25 years (EPA, 2002). His incidental soil ingestion rate is assumed to be 50 mg/day (EPA, 2002), and his inhalation rate is assumed to be 20 m^3/8-hour workday (EPA, 1991).

3.1.3.4 Current/Future Construction Worker

The construction worker scenario is used to evaluate short-term exposure to surface and subsurface soil (total soil) in either the current or future land-use scenario. Construction projects are expected to be infrequent. It is assumed that the construction worker participates in only one construction project on the site. Note that no construction projects are anticipated for Coal Yard No. 3, but this site is currently under NASA control and a construction project may be possible under current land use. Relevant exposure pathways include incidental ingestion and dermal contact, inhalation of dust raised by operating construction equipment, and inhalation of airborne VOCs released from subsurface soil during excavation and grading.

The construction worker is assumed to be a 70-kg adult who works 8 hours/day, approximately 5 days/week. This represents an annual exposure frequency rate of about 250 days per year, which is the same as described for the groundskeeper (Section 3.1.3.1) and indoor worker (Section 3.1.3.3). Construction projects involving soil exposure are assumed to last 6 months. The respiratory rate for the construction worker is assumed to be 20 m^3/8-hour workday (2.5 m^3/hr) (EPA, 1991). A soil ingestion rate of 330 mg/day is assumed for the construction worker (EPA, 2002). A dermal soil AF of 0.3 mg/cm^2 and an exposed body surface area of 3,300 cm^2 are assumed for the construction worker, which represent the head, hands, and forearms (EPA, 2002; 2004a).

3.1.3.5 Hypothetical Future On-Site Resident

The hypothetical future on-site residential scenario is used to evaluate the upper bound for long-term exposure to site soil. Residential land use is plausible because property abutting the PBOW facility is residential. This type of land use is also consistent with assumed future land use of other PBOW sites such as TNTA and TNTC (IT, 2001).

The hypothetical future on-site residential scenario is evaluated assuming a 30-year residential exposure scenario, considering exposure to a resident as a young child (6-year duration, ages 1 through 6 years) through the adult portion of life spent at this residence (24-year duration) (EPA, 1991). Noncancer hazard estimates are derived separately for the child and adult life stages.

Cancer risk is estimated as the sum of the risks calculated for the adult (24 years) and the child (6 years) (EPA, 2002; 2012c).

The hypothetical future resident is assumed to be exposed directly to total soil, because residential development would involve excavation and regrading, which would mix surface and subsurface soil. Relevant pathways for total soil exposure include incidental ingestion, dermal contact, and inhalation of dust and VOCs. Evaluation of VOCs from total soil is addressed during evaluation of airborne dust, as described for the groundskeeper. For evaluating inhalation of airborne dust, it is assumed that 80 percent of the soil surface is covered with pavement or vegetation. Inhalation of VOCs released from subsurface soil entrapped in indoor air is also evaluated. The hypothetical future resident is also assumed to be exposed to VOCs that have been released from subsurface soil through cracks in the building foundation to indoor air. It is noted that because some of the subsurface soil is expected to be brought to the surface in the future, using only subsurface soil data will conservatively result in some double counting of exposure to any VOC COPCs that may be present in the subsurface soil. This can be addressed in the uncertainty analysis in cases where the subsurface soil-to-indoor air pathway significantly affects risk and hazard estimates. This pathway did not contribute significantly to risk at Coal Yard No. 3, as no VOCs were identified as COPCs in subsurface soil.

The hypothetical future adult resident is assumed to be a 70-kg person with an incidental soil ingestion rate of 100 mg/day and an inhalation rate of 20 cubic meters per day (m^3/day) or 0.83 m^3/hr (EPA, 1991). A body surface area of 5,700 cm^2, representing the hands, forearms, head, and lower legs, is assumed to be available for dermal exposure to soil (EPA, 2004a). A soil AF of 0.07 mg/cm^2 is used as the default RME value for the adult resident (EPA, 2004a). The adult resident is assumed to be exposed for 350 days/year for 24 years (EPA, 1991; 2002).

The hypothetical future child resident is assumed to be a 1- through 6-year-old child with an average body weight of 15 kg, a soil ingestion rate of 200 mg/day, and an average inhalation rate of 10 m^3/day or 0.417 m^3/hr (EPA, 2004d). An average body surface area of 2,800 cm^2 throughout the 6-year childhood exposure period, representing the head, hands, forearms, lower legs, and feet, is assumed for dermal contact with soil (EPA, 2004a). A soil AF of 0.2 mg/cm^2 is used as the default RME value for the child resident (EPA, 2004a). The child resident is assumed to be exposed for 350 days/year for 6 years (EPA, 1991; 2002).

3.1.3.6 Future Hunter

This scenario is created to evaluate the potential for contaminants in soil to affect food chain pathways. Coal Yard No. 3 provides habitat for deer and other wildlife. Even though hunting is

not currently permitted at Coal Yard No. 3, deer hunting is permitted in other areas within PBOW; therefore, future use of Coal Yard No. 3 for hunting is evaluated in this BHHRA.

Many kinds of game animals may be hunted and consumed (e.g., squirrel, pheasant and other upland birds, turkey, deer); however, the deer is the species most likely to contribute meaningfully to the diet. Therefore, this evaluation is limited to a deer hunter. Potential exposure pathways include incidental surface soil ingestion, dermal contact with surface soil, and ingestion of venison from deer that browse plants growing on contaminated surface soil, all of which are evaluated quantitatively. Inhalation of airborne dust from wind currents is a potentially complete exposure pathway; however, vegetation reduces dust emissions to insignificant levels (EPA, 1996), and it is assumed that the deer hunter would spend virtually all of his time on vegetated rather than bare soil. Therefore, it is assumed that inhalation exposure would contribute much less than incidental ingestion, and the inhalation exposure pathway is not quantified separately from ingestion.

The deer hunter is assumed to be a 70-kg adult who harvests deer and consumes venison over a 30-year period. It is assumed that he spends 14 days per year hunting on PBOW. His incidental soil ingestion rate is assumed to be 100 mg/day (EPA, 1991). Hunting at PBOW occurs in the fall and winter. Given the temperate climate of northern Ohio during hunting season, a hunter would dress appropriately, with typically only the hands and head exposed, at most. The default industrial RME exposed skin surface area of 3,300 cm^2, which represents the hands, forearms, and head (EPA, 2004a), is conservatively assumed for the hunter. The default industrial RME soil AF of 0.2 mg/cm^2 (EPA, 2004a) is also assumed.

Data regarding the rate of venison ingestion were not located; therefore, a hypothetical scenario is adapted from the assumptions applied to a similar site in West Virginia (IT, 2000) and subsequently applied to TNTA and TNTC (IT, 2001). A highly conservative but plausible scenario consists of a hunter who kills one deer from the Coal Yard No. 3 property each year. It is assumed that the hunter eats 10 pounds (4.5 kg) of venison per year (Sharp, 1995). This consumption rate corresponds to 0.013 kilograms per day (kg/day) (0.186 grams per kilogram of body weight per day [g/kg-day]) of venison for each of the 350 days per year (EPA, 1991) that the hunter spends at his residence.

3.1.3.7 Future Hunter's Child

It is likely that a successful hunter, described in Section 3.1.3.6, would share his venison with the rest of the family, which may include small children. Small children, however, would be unlikely

to accompany the hunter afield. Therefore, the direct exposure pathways evaluated for the hunter (i.e., incidental ingestion and dermal contact with soil) are not evaluated for the small child.

Data regarding the rate of venison ingestion by small children were not located. However, if it is assumed that venison may replace beef in the diet, the differences in beef consumption between adults and children can be used to estimate a venison ingestion rate for children. EPA (1997a) provides per capita beef intake data for <1- to 5-year-old children ranging from 0.941 to 1.46 g/kg-day (time-weighted average of 1.296 g/kg-day). EPA (1997a) provides per capita beef intake data for 12- to 70-plus-year-old adults ranging from 0.568 to 0.83 g/kg-day (time-weighted average of 0.727 g/kg-day). From these data, it can be estimated that the rate of beef consumption for small children, expressed on a body weight basis, is approximately 1.8 times that of an adult. Therefore, a venison ingestion rate of 0.335 g/kg-day is estimated for a young child from the venison ingestion rate of 0.186 g/kg-day for the adult. Assuming that the child is 1 through 6 years old with an average body weight of 15 kg (EPA, 1991; 2002), the child's venison ingestion rate may be expressed as 0.005 kg/day.

3.1.3.8 Other Receptors Not Considered

Another plausible receptor group is delivery personnel. These receptors, however, would be less intensively exposed to soil than the groundskeeper; therefore, their exposures are not evaluated. Coal Yard No. 3 could become part of the area used for National Guard training activities. National Guard trainees, however, may be less exposed to any of the potentially contaminated media than the receptors identified above. Because they would likely not represent an upper bound for nonresidential exposure, these receptors are not evaluated.

3.2 Quantification of Exposure-Point Concentrations

The EPC is an estimate of the concentration of a COPC in a given medium to which a receptor may be exposed over the duration of the exposure. An EPC may be based on chemical concentrations in media that have been directly measured using laboratory analysis, or it may be derived based on environmental medium-to-medium transport modeling. The EPCs of COPCs in soil are derived based on measured analytical data. Concentrations of COPCs in air and venison are not measured (and in some cases cannot reasonably be measured) but are based on models that use the EPCs of COPCs in the appropriate directly measured media (e.g., soil concentrations as input values).

Section 3.2.1 describes the approaches used to derive EPCs for direct exposure to soil based on analytical measurements from soil samples. Models to derive EPCs for the air are described in Section 3.2.2, and the model used to derive venison EPCs is described in Section 3.2.3.

3.2.1 Soil Concentrations

Exposure to an environmental medium is generally assumed to be random, and the EPC should be the arithmetic average encountered over the duration of exposure (EPA, 1989a). Therefore, the population mean concentration, if known, would be the ideal value selected as the EPC. The sample mean is an obvious estimate of the population mean. However, uncertainties exist as to how well the sample mean represents the population mean. Therefore, EPA (1989a) has recommended the inclusion of a UCL for RME evaluation as a conservative estimate of the true mean exposure concentration.

The EPA (2011; 2010a,b) ProUCL (Version 4.1) software was used to estimate UCLs for the data sets of all environmental media represented by at least five samples. If the data set consists of fewer than five data points, the MDC was selected as the EPC. Please note that for the surface soil data sets, the MDC was used as the EPC because only four surface soil samples were collected. Analytical data from field duplicates are averaged with originals to yield one result for use in the statistical manipulations (Section 2.5). The method detection limit is used as the ProUCL input concentration for nondetects. Nondetect sample results with aberrantly high detection limits due to matrix interferences or other sample-specific causes are included in the initial ProUCL calculations. This is a conservative approach, as EPA (1989a) recommends that nondetect results with aberrantly high detection limits be removed from the data set so that calculation of the UCL is not unduly skewed by a nondetect. Because the latest version of ProUCL (EPA, 2011) includes mathematical manipulations under the default “with NDs” mode that are more robust than previous versions, single elevated detection limits are less likely to skew the UCL estimates than in the past. If it is observed during the risk characterization that an elevated nondetect value skews a UCL estimate such that this value substantially affects the result of the risk estimate, the ProUCL model is rerun without the elevated nondetect value and the risks are recalculated. If this recalculation is performed on a data set, data eliminated for the recalculation are identified in the risk characterization and discussed in the uncertainty analysis. The re-evaluation of elevated nondetects was not performed in the Coal Yard No. 3 BHHRA.

ProUCL generates a variety of UCL estimates for each data set. The ProUCL output for each COPC is included in Appendix B. Generally, the results of one or two (sometimes more) of the UCL estimates are recommended. This recommendation is based on a variety of factors, including the distribution (e.g., normal, lognormal, gamma, or not discernible) that provides the best fit, number of nondetects, size of the data set, and skewness. If the recommended value(s) under the default mode equals or exceeds the MDC, ProUCL is rerun using the full data set mode, under the assumption that the COPC is present in nondetects at one-half the reporting

limit. Occasionally, ProUCL recommends the 97.5 or 99 percent UCL on the arithmetic mean estimated by the Chebyshev method. In these cases, the UCL estimated by the Chebyshev method (95th percent) is selected as the EPC because this is more consistent with the intent of the RME paradigm as defined by EPA (1989a; 1991).

The UCL generated by the ProUCL protocol described in the preceding paragraphs or the MDC, whichever is smaller, is selected as the EPC and is understood to represent a conservative estimate of average for use in the risk assessment or in various transport models used to estimate EPCs. Note that EPA (1989a) guidance states that an estimate of average rather than the MDC should be used to represent the EPC under chronic exposure and that use of the maximum is typically not reasonable. Therefore, data sets which use the MDC as the EPC are generally biased high. Unusually high detected values are included in the calculation of the UCL concentration. Inclusion of these high values increases the statistical variability and the overall conservativeness of the risk estimate.

ProUCL is a software tool that provides estimates of the UCL using a variety of mathematical approaches. As mentioned, its output includes one or more recommendations. Depending on the data set, some of the estimates generated by the various calculation methods included in ProUCL may vary by an order of magnitude. ProUCL and the decision tree on which its recommendations are based have been developed using multitudes of simulated data sets with a variety of distributions and other characteristics. There are uncertainties as to how well this decision tree derives a recommended UCL for a given data set. This uncertainty tends to increase with variability and skewness and where a large number of the samples are nondetects. For example, with respect to distribution testing, ProUCL bases the determination of distribution type only on the detected samples. The true concentrations of the nondetected values are unknown, and this lack of information can affect the distribution determination and consequently affect the ProUCL recommendation. The general uncertainties associated with the EPC values and the use of ProUCL are discussed in the uncertainty analysis (Chapter 6.0). Specific uncertainties associated with the EPC values of specific data sets may be discussed in the uncertainty analysis as appropriate.

3.2.2 Exposure-Point Concentrations in Air

COPC concentrations in air are modeled rather than measured. The only air-related model pertinent for this BHHRA addendum is the soil-to-dust particulate model. Inhalation exposure to particulate (dust) emissions from soils for the groundskeeper and construction worker evaluations arises from activities that raise dust. Therefore, the most appropriate approach for

estimating chemical concentrations in ambient air is the use an activity-based dust loading equation (U.S. Department of Energy [DOE], 1989):

Eq. 3.1

$$C_a = (D)(C_s)(CF_1)$$

where:

C_a	=	contaminant concentration in air (milligrams per cubic meter [mg/m^3], calculated)
D	=	dust loading factor (grams [g] of soil/m^3 of air)
C_s	=	contaminant concentration in soil (mg/kg)
CF_1	=	conversion factor (1E-3 kg per g).

Plausible values for D include 2E-4 grams per cubic meter (g/m^3) for agricultural activity (DOE, 1989), 6E-4 g/m^3 for construction work (DOE, 1983), and 1E-4 g/m^3 for other activity (National Council on Radiation Protection and Measurements, 1984). The value for D of 1E-4 g/m^3 for other activity is used for the groundskeeper. It is assumed that construction activities requiring intensive contact with soil, for which D = 6E-4 g/m^3 is appropriate, may last for one-half of a construction period. The remaining one-half of the time is more realistically characterized by D = 1E-4 g/m^3. Therefore, a time-weighted average dust loading factor for construction work of 3.5E-4 g/m^3 is estimated for the construction worker.

Airborne concentrations of VOCs estimated by the dust loading model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the dust loading model treats the VOCs as if they were located at the ground surface.

The resident is more likely to be exposed to dust arising from wind erosion than from dust-raising activities on the site. EPA (1996) derived a model for estimating a dust particulate emission factor (PEF) based on an "unlimited reservoir" model and the assumption that the source area is square:

Eq. 3.2

$$PEF = Q/C \times \frac{3600}{0.036 \times (1 - V) \times (U_m / U_t)^3 \times F(x)}$$

where:

PEF	=	particulate emission factor (cubic meters per kilogram [m^3/kg], calculated)
Q/C	=	inverse of the mean concentration at center of square source (55.99 grams per square meter-second per kg/m^3, site-specific value from Table 3 in EPA [1996] [Zone 7, Cleveland, 5-acre site])
3600	=	seconds/hour
V	=	fraction of surface covered with vegetation (0.8, unitless, assumed)

U_m = mean annual wind speed (default, 4.60 meters per second [m/second] equals mean annual wind speed of 10.3 miles per hour [Section 3.1.1])
U_t = equivalent threshold value of wind speed at 7 meters (default, 11.32 m/second)
F(x) = function dependent on U_m/U_t (default, 0.194).

The concentration of a COPC in air is calculated as follows:

Eq. 3.3

$$C_a = \frac{C_s}{PEF}$$

where:

C_a = contaminant concentration in air (mg/m^3, calculated)
C_s = contaminant concentration in soil (mg/kg)
PEF = particulate emission factor (m^3/kg).

Airborne concentrations of VOCs estimated by the wind erosion model are assumed to sufficiently estimate levels of VOCs that may arise from volatilization, because the wind erosion model treats the VOCs as if they were located at the ground surface.

3.2.3 Exposure-Point Concentrations of COPCs in Venison

The hunter is assumed to harvest and consume game and share it with family members, including small children. The game is assumed to be venison, because the white-tailed deer is the species hunted most widely and most likely to provide a regular contribution to the diet. Data do not exist to reliably estimate contaminant concentrations in venison, but the following simplifying assumptions permit estimates sufficient for a BHHRA.

- Deer are small ruminants and, as such, are not unlike cattle; thus, it is reasonable to assume they may have similar physiological processes that could yield similar biotransfer factors. Unlike beef, however, deer meat does not undergo marbling with fat, and deer fat is quite unpalatable and is likely to be trimmed rather than consumed. Therefore, the biotransfer factors for edible venison are derived by adjusting biotransfer factors for beef to account for differences in the fat content of table-ready beef (cooked choice retail cuts trimmed to 0 inches of fat: average 14.4 percent fat) and venison (cooked boneless muscle meats: average 2.9 percent fat) (Nutrient Database, 1997).

- Deer are expected to browse a much larger area than that encompassed by Coal Yard No. 3; therefore, the fraction of total browse consumed from Coal Yard No. 3 is expected to be relatively small.

- Indirect food chain pathways may be significant for some inorganics and for those semivolatile organic compounds that persist in the environment and have the

tendency to bioaccumulate. VOCs are generally mobile in the environment and labile in biological systems and do not tend to bioaccumulate.

To reflect the assumptions previously noted, venison biotransfer factors are estimated by multiplying beef biotransfer factors by 2.9/14.4 (or 0.20), and by a fraction, FI_r. This fraction reflects the areal portion of the site compared to a deer's home range area. These assumptions are captured in the following equation:

Eq. 3.4

$$B_v = 0.20(B_b)(FI_r)$$

where:

B_v	=	biotransfer factor for venison (unitless, calculated)
0.20	=	factor to reflect differences in fat content between beef and venison (0.20, unitless, see above)
FI_r	=	areal portion of site compared to a deer's home range (0.03, unitless, see below)
B_b	=	biotransfer factor for beef.

Values for B_b for inorganics are provided in the toxicity profiles (Appendix C of the Ash Pit No. 3 BHHRA [Shaw, 2013a]). Toxicity profiles are prepared for each of the COPCs. The toxicity profiles briefly describe the uses of the chemical, its physical properties, behavior in environmental media, biotransfer capability, and toxicity values.

The Coal Yard No. 3 area is relatively small in comparison to the home range of a white-tailed deer. The total acreage of the Coal Yard No. 3 study area is about 1 acre. The home range of the white-tailed deer is between 150 and 1,280 acres (Sample and Suter, 1994). Even if the low end of this range (150 acres) is assumed for deer in northern Ohio, the area represented by Coal Yard No. 3 is less than 1 percent of this land area. Although the use of FI_r equal to 0.01 or lower is justified, an FI_r value of 0.03 is used in the BHHRA to be consistent with other small sites evaluated at PBOW.

Deer are assumed to be exposed to contaminants by ingesting browse growing on contaminated soil. It is estimated that deer consume approximately 1.74 kg of browse per day (Sample et al., 1996), which is approximately 50 percent dry matter (DM), or 0.87 kg browse DM per day (Mautz et al., 1976). The contaminant concentration in browse is estimated from the following equation, which was originally developed for estimating the contaminant concentration in forage to which cattle may be exposed (EPA, 1994):

Eq. 3.5

$$C_p = (CF)(C_s)(B_p)$$

where:

C_p	=	concentration of contaminant in (plant) forage DM (mg/kg, calculated)
CF	=	conversion factor to adjust for soil containing 20 percent moisture (1.25, unitless).
C_s	=	concentration of contaminant in soil (mg/kg)
B_p	=	soil-to-forage biotransfer factor (mg of chemical per kg of dry plant/mg of chemical per kg of dry soil).

Values for B_p are taken from the toxicity profiles in Appendix C of the Ash Pit No. 3 BHHRA (Shaw, 2013a). B_p values for the vegetative parts of plants, rather than the reproductive parts of plants, are selected, as possible, because deer browse year-round, and the vegetative parts are more available for the greater part of the year.

The concentration of a COPC in venison can be estimated from the following equation (adapted from EPA [1994]):

Eq. 3.6

$$C_v = (Q_p)(C_p)(B_v)$$

where:

C_v	=	contaminant concentration in venison (mg/kg, calculated)
Q_p	=	browse ingestion rate (0.87 kg DM/day)
C_p	=	contaminant concentration in browse DM (mg/kg)
B_v	=	biotransfer factor for venison (days/kg).

3.3 Quantification of Chemical Intake

This section describes the models used to quantify doses or intakes of the COPCs by the exposure pathways identified previously. Models were taken or modified from EPA (1989a) unless otherwise indicated.

3.3.1 Inhalation of COPCs in Air

The inhaled dose of a COPC in air (for the groundskeeper, construction worker, and future on-site resident: inhalation of dust and VOCs in ambient air from surface or total soil; for the construction worker: inhalation of VOCs in ambient air from subsurface soil; for the future indoor worker and future on-site resident: inhalation of VOCs in indoor air from subsurface soil) is estimated as follows:

Eq. 3.7

$$I_a = \frac{(C_a)(FI_a)(IR_a)(EF)(ED)}{(BW)(AT)}$$

where:

I_a	=	inhaled dose of COPC (milligrams per kilograms per day [mg/kg-day], calculated)
C_a	=	concentration of COPC in air (mg/m^3)
FI_a	=	fraction of exposure attributed to site media (unitless)
IR_a	=	inhalation rate (m^3/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

3.3.2 Incidental Ingestion of COPCs in Soil

The ingested dose of a COPC in soil is estimated from the following equation:

Eq. 3.8

$$I_s = \frac{(C_s)(FI_s)(IR_s)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

I_s	=	ingested dose of COPC from soil (mg/kg-day, calculated)
C_s	=	concentration of COPC in soil (mg/kg)
FI_s	=	fraction of exposure attributed to site soil (unitless)
IR_s	=	ingestion rate of soil (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
CF	=	conversion factor (1E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days).

3.3.3 Dermal Contact with COPCs in Soil

Unlike the methodologies for estimating inhaled or ingested doses of a COPC, which quantify the dose presented to the barrier membrane (the pulmonary or gastrointestinal mucosa, respectively), dermal dose is estimated as the dose that crosses the skin and is systemically absorbed. For this reason, dermal toxicity values are also based on absorbed dose. The absorbed dose of a COPC is estimated from the following equation (EPA, 2004a):

Eq. 3.9

$$DAD = \frac{(DA)(SA)(EF)(ED)}{(BW)(AT)}$$

where:

DAD	=	average dermally absorbed dose of COPC (mg/kg-day, calculated)
DA	=	dose absorbed per unit body surface area per day (milligrams per square centimeter per day [mg/cm^2-day])
SA	=	SA_s for soil, surface area of the skin exposed (cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

Dermal uptake of constituents from soil (groundskeeper, construction worker, future on-site resident or hunter) assumes that absorption is a function of the fraction of a dermally applied dose that is absorbed. DA is calculated from the following equation (EPA, 2004a):

Eq. 3.10

$$DA = (C_s)(FI_s)(CF)(AF)(ABS)$$

where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C_s	=	concentration of COPC in soil (mg/kg)
FI_s	=	fraction of exposure attributed to site soil (unitless)
CF	=	conversion factor (1E-6 kg/mg)
AF_s	=	soil-to-skin adherence factor (mg/cm^2-day)
ABS	=	absorption factor (unitless, chemical-specific).

ABS values are provided in Table 3-3.

3.3.4 Consumption of Venison

Consumption of venison by the hunter or the hunter's child is evaluated by the following equation:

Eq. 3.11

$$I_v = \frac{(C_v)(IR_v)(EF)(ED)}{(BW)(AT)}$$

where:

I_v	=	ingested dose of COPC in venison (mg/kg-day, calculated)
Cv	=	concentration of COPC in venison (mg/kg)
IRv	=	venison ingestion rate (kg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days).

4.0 Toxicity Evaluation

Toxicity is defined as the ability of a chemical to induce adverse effects in biological systems. The purpose of the toxicity assessment is two-fold:

- Identify the cancer and noncancer effects that may arise from exposure of humans to the COPC (hazard assessment).
- Provide an estimate of the quantitative relationship between the magnitude and duration of exposure and the probability or severity of adverse effects (dose-response assessment).

The latter is accomplished by the derivation of cancer and noncancer toxicity values, as described in the following sections.

4.1 Evaluation of Carcinogenicity

A few chemicals are known, and many more are suspected, to be human carcinogens. The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect (EPA, 2005). The qualitative aspect is a weight-of-evidence evaluation of the likelihood that a chemical might induce cancer in humans. EPA (2005) recognizes five weight-of-evidence group classifications for carcinogenicity. Formerly, EPA (1986) used a letter-based system to describe the weight of evidence for carcinogenicity. Reference to this former system is included because many of the carcinogenicity assessments listed on the Integrated Risk Information System (IRIS) use the former letter-based system (EPA, 2013). The five EPA weight-of-evidence classifications are as follows:

- ***Carcinogenic to Humans*** (corresponds to the former Group A – Human Carcinogen).
- ***Likely to be Carcinogenic to Humans*** (includes both the former Group B1 and Group B2 – Probable Human Carcinogens)
- ***Suggestive Evidence of Carcinogenic Potential*** (corresponds to the former Group C – Possible Human Carcinogen)
- ***Inadequate Information to Assess Carcinogenic Potential*** (corresponds to the former Group D – Not Classifiable as to Human Carcinogenicity)
- ***Not Likely to be Carcinogenic to Humans*** (corresponds to the former Group E – Evidence of Noncarcinogenicity to Humans).

The toxicity value for carcinogenicity, called a cancer slope factor (SF), is an estimate of potency. SFs are developed only for chemicals in the first three groups and only if the data are sufficient. The SFs are statistically derived from the dose-response curve from the best human or animal study or studies of the chemical. Human data are often considered to be more reliable than animal data because there is no need to extrapolate the results obtained in one species to another. Because human studies typically have limitations (e.g., uncertainties regarding exposure concentrations, durations, lack of experimental control, small sample sizes, and representativeness of the exposed population), most SFs are derived from animal data. Uncertainties associated with animal studies are further mentioned in the uncertainties analysis.

The SF is expressed as risk per mg/kg-day, shown mathematically as $(\text{mg/kg-day})^{-1}$. To be appropriately conservative, the SF is usually the 95 percent upper bound on the slope of the dose-response curve extrapolated from high (experimental) doses to the low-dose range expected in environmental exposure scenarios. EPA (2005) assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk, however miniscule it may be.

The oral SF is usually derived directly from the experimental dose data, because oral dose is usually expressed as mg/kg-day. When the test chemical was administered in the diet or drinking water, oral dose first must be estimated from data for the concentration of the test chemical in the food or water, food or water intake data, and body weight data.

IRIS (EPA, 2013) expresses inhalation cancer potency as a unit risk based on concentration, or risk per microgram of chemical per m^3 of ambient air, shown mathematically as (micrograms per cubic meter [$\mu g/m^3$])$^{-1}$. Because cancer risk characterization requires an SF expressed as risk per mg/kg-day, the unit risk must be converted to the mathematical equivalent of an inhalation cancer SF, or risk per unit dose as $(\text{mg/kg-day})^{-1}$. Because the inhalation unit risk is based on continuous lifetime exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the unit risk (per $\mu g/m^3$) by 70 kg and by 1,000 micrograms per milligram, and dividing the result by 20 m^3 per day.

4.2 Evaluation of Noncarcinogenic Effects

Many chemicals, whether or not associated with carcinogenicity, are associated with adverse noncarcinogenic effects. The evaluation of noncancer effects (EPA, 1989b) involves the following:

- Qualitative identification of the adverse effect(s) associated with the chemical; these may differ depending on the duration (acute or chronic) or route (oral or inhalation) of exposure.

- Identification of the critical effect for each duration of exposure (i.e., the first adverse effect that occurs as dose is increased).

- Estimation of the threshold dose for the critical effect for each duration of exposure.

- Development of an uncertainty factor (UF); i.e., quantification of the uncertainty associated with interspecies extrapolation, intraspecies variation in sensitivity, severity of the critical effect, slope of the dose-response curve, and deficiencies in the database, in regard to developing a reference dose (RfD) for human exposure.

- Identification of the target organ(s) for the critical effect for each route of exposure.

These information points are used to derive an exposure route- and duration-specific toxicity value called an RfD, expressed as mg/kg-day, which is considered to be the dose for humans, with uncertainty of an order of magnitude or greater, at which adverse effects are not expected to occur. Mathematically, it is estimated as the ratio of the threshold dose to the UF. For purposes of risk assessment, chronic exposure is typically defined as equal to or greater than 7 years, i.e., at least 10 percent of expected life span; subchronic exposure is typically defined as 2 weeks to 7 years. However, professional judgment may be used where exposure durations approach 10 percent of the expected life span. Also, exposure during a critical stage of development, such as a portion of early childhood, may be treated as chronic even if the anticipated exposure duration is considerably less than 10 percent of the expected life span.

IRIS (EPA, 2013) expresses the inhalation noncancer reference value as a reference concentration (RfC) in units of mg/m^3. Because the noncancer hazard characterization described in the work plan (Shaw, 2009) requires a reference value expressed as mg/kg-day, the RfC is converted to an inhalation RfD. Because the inhalation RfC is based on continuous exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kg), the mathematical conversion consists of multiplying the RfC (mg/m^3) by 20 m^3/day and dividing the result by 70 kg.

RfD and RfC values are derived for both chronic and subchronic exposure. Under the assumption of monotonicity (incidence, intensity, or severity of effects can increase, but cannot decrease, with increasing magnitude or duration of exposure), a chronic RfD may be considered sufficiently protective for subchronic exposure, but a subchronic RfD may not be protective for

chronic exposure. Currently, subchronic RfD values exist for few chemicals. Subchronic RfD values can be derived from chronic RfD values as follows:

- If the UF applied in the derivation of the chronic RfD (or RfC) does not provide for expansion from subchronic to chronic exposure (e.g., if the chronic RfD was derived from a chronic study), the chronic RfD is adopted as being sufficiently protective for subchronic exposure.

- If the UF applied in the derivation of the chronic RfD (or RfC) contains a component to expand from subchronic to chronic exposure, the subchronic RfD is derived by multiplying the chronic RfD by the factor used to expand from subchronic to chronic exposure (e.g., if a factor of 10 was used to expand from subchronic to chronic exposure, the subchronic RfD would be 10 times larger than the chronic RfD).

Only chronic RfDs and RfCs are used in the risk characterization of this BHHRA.

4.3 Dermal Toxicity Values

Dermal RfDs and SFs are derived from the corresponding oral values, provided there is no evidence to suggest that dermal exposure induces exposure route-specific effects that are not appropriately modeled by oral exposure data. In the derivation of a dermal RfD, the oral RfD is multiplied by the gastrointestinal absorption factor (GAF), expressed as a decimal fraction. The resulting dermal RfD, therefore, is based on absorbed dose. The RfD based on absorbed dose is the appropriate value with which to compare a dermal dose, because dermal doses are expressed as absorbed doses rather than exposure doses. The dermal SF is derived by dividing the oral SF by the GAF. The oral SF is divided, rather than multiplied, by the GAF because the SF is expressed as a reciprocal dose.

4.4 Target Organ Toxicity

As a matter of science policy, EPA assumes dose and effect to be additive for noncarcinogenic effects (EPA, 1989a). This assumption provides the justification for adding the HQ or hazard index (HI) values in the risk characterization for noncancer effects (Section 5.2) resulting from exposure to multiple chemicals, pathways, or media. However, EPA (1989a) acknowledges that adding all HQ or HI values may overestimate hazard, because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism.

Mechanisms of toxicity data sufficient for predicting additivity with a high level of confidence are available for very few chemicals. In the absence of such data, EPA (1989a) assumes that chemicals that act on the same target organ may do so by the same mechanism of toxicity; that is, the target organ serves as a surrogate for mechanism of toxicity. When the total HI for all

media for a receptor exceeds 1 due to the contributions of several chemicals, it is appropriate to segregate the chemicals by route of exposure and mechanism of toxicity (i.e., target organ) and estimate separate HI values for each target organ.

As a practical matter, because human environmental exposures are likely to involve near- or sub-threshold doses, the target organ chosen for a given chemical is the one associated with the critical effect. If more than one organ is affected by a given chemical at the threshold, then all affected target organs are selected for this chemical. The target organ is also selected on the basis of duration of exposure (i.e., the target organ for chronic or subchronic exposure to low or moderate doses is selected rather than the target organ for acute exposure to high doses) and route of exposure. Because dermal RfD values are derived from oral RfD values, the oral target organ is adopted as the dermal target organ. For some chemicals, no target organ is identified. This occurs when no adverse effects are observed or when adverse effects such as reduced longevity or growth rate are not accompanied by recognized organ- or system-specific functional or morphologic alteration.

4.5 Sources of Toxicity Information Used in the Risk Assessment

Toxicity values were selected for use in the BHHRA based on EPA Office of Solid Waste and Emergency Response Directive 9285.7-53 (EPA, 2003), which prescribes the following hierarchy:

- **Tier 1** values: IRIS (EPA, 2013) database.
- **Tier 2** values: These are EPA's provisional peer-reviewed toxicity values. The provisional peer-reviewed toxicity values are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.
- **Tier 3** values: These are other toxicity values from additional EPA and non-EPA sources of toxicity information. As stated in the EPA Office of Solid Waste and Emergency Response directive, "priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed." Two common examples of Tier 3 values are the EPA's Health Effects Assessment Summary Tables (EPA, 1997b) and the California Environmental Protection Agency (2013) Office of Environmental Health Hazard Assessment Toxicity Criteria Database.

The Environmental Council of States-U.S. Department of Defense (2007) has issued a toxicity value hierarchy that basically supports the EPA (2003) hierarchy presented previously but places higher emphasis on the necessity for external peer review.

GAFs used to derive dermal RfD values and SFs from the corresponding oral toxicity values are obtained from the following sources, in order of hierarchy:

- Oral absorption efficiency data compiled by the National Center for Environmental Assessment for the Superfund Health Risk Technical Support Center of EPA, as listed in EPA (2004a)
- Federal agency reviews of the empirical data, such as Agency for Toxic Substances and Disease Registry toxicological profiles and various EPA criteria documents
- Other published reviews of the empirical data
- The primary literature.

GAFs obtained from reviews are compared to empirical (especially more recent) data, when possible, and are evaluated for suitability for use in deriving dermal toxicity values from oral toxicity values. Some of the GAF values are also listed on the RSL table (EPA, 2013). The suitability of the GAF increases when the following similarities are present in the oral pharmacokinetic study from which the GAF is derived and in the key toxicity study from which the oral toxicity value is derived:

- The same strain, sex, age, and species of test animal were used.
- The same chemical form (e.g., the same salt or complex of an inorganic element or organic compound) was used.
- The same mode of administration (e.g., diet, drinking water, or gavage vehicle) was used.
- Similar dose rates were used.

Individual COPC-specific toxicity profiles, including sources of the toxicity and GAF values, are included in Appendix C of the AP3 BHHRA (Shaw, 2013a) for all of the COPCs evaluated this BHHRA addendum. Summary toxicity information sufficient to support the risk calculations, including toxicity values, and GAFs are provided in Table 4-1.

5.0 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of site-specific contaminants. This is done by combining the intake rates estimated during the exposure assessment with the appropriate toxicity information identified during the toxicity assessment. Noncancer hazards and cancer risks are characterized separately, including COPCs that induce both types of effects.

Quantitative expressions are calculated during risk characterization that describe the probability of developing cancer (i.e., ILCRs), or the nonprobabilistic comparison of estimated dose with an RfD for noncancer effects (i.e., HQs and HIs). Quantitative estimates are developed for individual chemicals, exposure pathways, and exposure media for each receptor. These quantitative risk characterization expressions, in combination with qualitative information, are used to guide risk management decisions. Risk characterization, as described in this chapter, is applied only to COPCs.

Generally, the risk characterization follows the methodology prescribed by EPA (1989a), as modified by more recent information and guidance. EPA methods are designed to be health protective and tend to overestimate rather than underestimate risk (EPA, 1989a; Burmaster and Harris, 1993; Cogliano, 1997). The risk results, however, may be overly conservative, because risk characterization involves multiplication of the conservative assumptions built into the estimation of the EPCs, exposure (intake) estimates, and toxicity dose-response assessments.

5.1 Cancer Risk

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime and is called the ILCR. In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (EPA, 1989a):

Eq. 5.1

$$ILCR = (CDI)(SF)$$

where:

ILCR = incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
CDI = chronic daily intake, averaged over 70 years (mg/kg-day)
SF = cancer slope factor (risk per mg/kg-day).

The chronic daily intake (CDI) term in Equation 5.1 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.7 through 3.9 and 3.11 when these equations are evaluated for cancer intakes.

The use of Equation 5.1 assumes that chemical carcinogenesis does not exhibit a threshold and that the dose-response relationship is linear in the low-dose range. Because this equation could generate theoretical cancer risks greater than 1 for high-dose levels, it is considered to be inaccurate at cancer risks greater than 1E-2. In these cases, cancer risk is estimated by the following one-hit model (EPA, 1989a):

Eq. 5.2

$$ILCR = 1 - e^{[-(CDI)(SF)]}$$

where:

ILCR	=	incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
$-e^{(CDI)(SF)}$	=	the exponential of the negative of the risk calculated using Equation 5.1.

Because all of the risks associated with Coal Yard No. 3 COPCs are less than 1E-2, only Equation 5.1 was used in this BHHRA. As a matter of policy, EPA (1986) considers the carcinogenic potency of simultaneous exposure to low doses of carcinogenic chemicals to be additive, regardless of the chemicals' mechanisms of toxicity or sites of action (organs of the body). Cancer risk arising from exposure to multiple chemicals in a given exposure medium and pathway is estimated from the following equation (EPA, 1989a):

Eq. 5.3

$$ILCR_p = ILCR_{(chem\,1)} + ILCR_{(chem\,2)} + \cdots ILCR_{(chem\,i)}$$

where:

$ILCR_p$	=	total pathway risk of cancer incidence, calculated
$ILCR_{(chem\ i)}$	=	individual chemical cancer risk for the pathway.

The sum of the ILCRs summed across pathways is the total ILCR as shown in the following equation:

Eq. 5.4

$$Total\ ILCR = ILCR_{(p\,1)} + ILCR_{(p\,2)} + \cdots ILCR_{(p\,i)}$$

where:

Total ILCR	=	total incremental lifetime cancer risk across all pathways
$ILCR_{pi}$	=	incremental lifetime cancer risks associate with pathway "*i*."

The total ILCR represents all additional cancer risks posed to a given receptor by contact with contaminants in site environmental media.

Total ILCRs in the range of 1E-6 to 1E-4 are regarded as acceptable (EPA, 1990); as mentioned in Section 2.4.1, this range is referred to as the “NCP risk management range.” Risks less than this range are regarded as negligible. A target cancer risk goal of 1E-5, the logarithmic midpoint of the NCP risk management range, was selected by the PBOW PDT as a basis to consider remedial action. This 1E-5 goal is also recognized by the State of Ohio as a goal for cancer risk (OEPA, 2009b). Use of this 1E-5 goal represents a departure from the Army’s practice of using a cancer risk exceeding a value of 1E-4 (the upper end of the NCP risk management range) to trigger remedial action considerations. Total ILCR values are rounded to one significant figure, consistent with EPA (1989a) guidance.

5.2 Noncancer Effects of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with an RfD. The HQ, defined as the ratio of intake to RfD, is estimated as follows (EPA, 1989a):

Eq. 5.5

$$HQ = I \ / \ RfD$$

where:

HQ	=	hazard quotient (unitless, calculated)
I	=	intake of chemical averaged over subchronic or chronic exposure period (mg/kg-day)
RfD	=	reference dose (mg/kg-day).

The “I” term in Equation 5.4 is equivalent to the "I" or "DAD" terms (intake or dose) in Equations 3.7 through 3.9 and 3.11 when these equations are evaluated for noncancer intakes.

Chemical noncancer hazards are evaluated using chronic RfD values. This approach is different from the probabilistic approach used to evaluate cancer risks. An HQ of 0.01 does not imply a 1-in-100 chance of an adverse effect, but indicates only that the estimated intake is 100 times lower than the RfD. An HQ of unity indicates that the estimated intake equals the RfD. If the HQ is greater than unity, there may be concern for potential adverse health effects.

In the case of simultaneous exposure of a receptor to multiple chemicals, or to a given chemical by multiple pathways, an HI is calculated as the sum of the HQs by the following equation:

Eq. 5.6

$$HI = HQ_1 + HQ_2 + ... HQ_i$$

where:

HI = hazard index (unitless, calculated)
HQ_i = hazard quotient for the ith chemical, or for the ith pathway.

A total HI is calculated as the sum of all HI values, including all media and all COPCs, for a given receptor. Calculating a total HI as the sum of HQ values is based on the assumption that the potential for noncancer effects is additive. EPA (1989a), however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism (Section 4.4). Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ.

A total target organ HI is calculated by summing the HI values (associated by target organ[s]), across exposure pathways as follows:

Eq. 5.7

$$Total\ Target\ Organ\ HI_a = HI_{p1-a} + HI_{p2-a} + ...HI_{pi-a}$$

where:

Total target organ HI_a = total hazard index for target organ "*a*" (unitless, calculated)
HI_{pi-a} = hazard index for target organ "*a*" via pathway "*i*."

HI values of 1 or less indicate that adverse noncancer health effects associated with that target organ of any individual under the exposure assumptions for that receptor are unlikely. If the total target organ HI exceeds a value of 1, then adverse noncancer health effects concerning that target organ and receptor cannot be regarded as unlikely. Total HI values (including those specific to target organs) are rounded to one significant figure or to the nearest whole number if greater than 1, consistent with EPA (1989a) guidance.

5.3 Risk Characterization Results

Cancer risk characterization results were evaluated for each receptor and each environmental medium, using the method described in Section 5.1. Please note that none of the COPCs for Coal Yard No. 3 have recognized noncancer effects. Therefore, the noncancer effects associated with COPCs in site soils are regarded as negligible. The following sections describe the risk characterization results for each receptor associated with Coal Yard No. 3. Risk summary tables are shown for each receptor as referenced. The detailed quantitative evaluation tables that include the exposure equations presented in Chapter 3.0 and the risk characterization equations

presented in Chapter 5.0 are provided in Appendix C. Analytical results used as input for the BHHRA are included as Appendix A.

5.3.1 Current Groundskeeper

The ILCR for the current groundskeeper (Table 5-1) exposed to surface soil both through direct contact and via inhalation of suspended particulates is estimated as 3E-6. This is within the 1E-6 to 1E-4 NCP risk management range and is less than the PBOW cancer risk goal of 1E-5.

Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 surface soil are regarded as negligible.

5.3.2 Future Groundskeeper

The exposure assumptions for the future groundskeeper typically differ from those of the current groundskeeper (Section 5.3.1) in that the future groundskeeper is assumed to be exposed to total soil rather than surface soil. As described in Section 2.5, surface soil EPCs were conservatively used to represent total soil for Coal Yard No. 3 because no COPCs were identified for subsurface soil, indicating no impact from former site operations to the subsurface soil. Therefore, it was conservatively assumed that all exposure to site soil was to surface soil. The ILCR and noncancer hazard evaluation results of this receptor are the same as those described in Section 5.3.1.

5.3.3 Future Indoor Worker

The exposure assumptions for the future indoor worker include direct contact with surface soil and inhalation of volatiles from subsurface soil. The total ILCR for the future indoor worker is 8E-7 (Table 5-1). This value is less than the NCP risk management range and is thus regarded as de minimis. It is also less than the PBOW target cancer risk goal of 1E-5.

Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 soil are regarded as negligible.

5.3.4 Construction Worker

The construction worker is assumed to be exposed to COPCs in total soil, both through direct contact and via inhalation of suspended particulates. As described in Section 2.5, surface soil EPCs were conservatively used to represent total soil for Coal Yard No. 3 because no COPCs were identified for subsurface soil, indicating no impact from former site operations to the subsurface soil. The resulting ILCR of the Coal Yard No. 3 construction worker is estimated as 1E-7 (Table 5-1). This is less than the 1E-6 to 1E-4 NCP risk management range, and cancer

risks are therefore regarded as de minimis. This ILCR is also less than the PBOW cancer risk goal of 1E-5.

Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 total soil are regarded as negligible.

5.3.5 Hypothetical Future On-Site Resident

The exposure assumptions for the hypothetical future resident include direct contact with total soil, inhalation of particulates from total soil, and inhalation of volatiles from subsurface soil. As described in Section 2.5, surface soil EPCs were conservatively used to represent total soil for Coal Yard No. 3 because no COPCs were identified for subsurface soil, indicating no impact from former site operations to the subsurface soil. The ILCR was calculated assuming exposure during a combined 30-year child/adult exposure duration, whereas separate noncancer HI values are typically calculated for the young child and adult life stages (Section 3.1.3.5). The results of each are in Sections 5.3.6 and 5.3.7.

The total ILCR for the future hypothetical resident is 9E-6 (Table 5-1). This value is within the NCP risk management range and less than the PBOW target cancer risk goal. Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 soil are regarded as negligible.

5.3.6 Adult Hunter

The ILCR for the future adult hunter (Table 5-1) exposed to surface soil both through direct contact and via the ingestion of venison is estimated as 2E-7. This value is less than the 1E-6 to 1E-4 NCP risk management range and is thus regarded as de minimis. This ILCR is also less than the PBOW cancer risk goal of 1E-5.

Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 surface soil are regarded as negligible.

5.3.7 Hunter's Child

The ILCR for the hunter's child (Table 5-1) exposed to surface soil via the ingestion of venison from deer which grazed on site cannot be quantified because none of the carcinogenic COPCs in surface soil bioaccumulate in food. Cancer risks associated with PBOW to this receptor are regarded as de minimis and less than the 1E-6 to 1E-4 NCP risk management range and the PBOW cancer risk goal of 1E-5.

Because none of the COPCs have recognized noncancer effects, the noncancer hazards associated with these chemicals in Coal Yard No. 3 surface soil are regarded as negligible.

6.0 Uncertainty Analysis

The primary objective of the BHHRA is to characterize and quantify potential human health risks. However, these risks are estimated using incomplete and imperfect information that introduces uncertainties at various stages of the risk assessment process. Uncertainties associated with earlier stages of the risk assessment become magnified when they are linked with other uncertainties in the latter stages. Reliance on a simplified numerical presentation of dose rate and risk without consideration of uncertainties, limitations, and assumptions inherent in their derivation can be misleading. For example, the calculated ILCR for a given scenario "A" may be 1E-5 (meets the PBOW risk goal) and that of scenario "B" may be 5E-5 (exceeds the PBOW risk goal). However, if the uncertainties associated with scenario "B," for instance, span orders of magnitude and the ILCR is regarded as biased high, it is not unlikely that scenario "A" actually presents a higher risk of developing cancer.

The chief goal of this analysis is to evaluate uncertainties and present them in context of their potential impact on the interpretation of the risk assessment results and the types of environmental management decisions that may be based on these results. The uncertainty analysis does not exhaustively describe all potential uncertainties but presents those that have the largest implications for the interpretation of the risk assessment results. This analysis also summarizes the types and, as applicable, the magnitude of the uncertainties at each stage of the risk assessment. Although the discussion in the following sections includes generic uncertainties that are common to the state of human health risk assessment practice overall (e.g., additivity of health effects in the risk characterization), the uncertainty analysis focuses on the sets of uncertainties that are specific to Coal Yard No. 3.

6.1 Types of Uncertainty

Uncertainties in risk assessment are categorized into two general types: 1) variability inherent in the (true) heterogeneity of the data set, measurement precision, and measurement accuracy; and 2) uncertainty that arises from data gaps. Estimates of the degree of variability tend to decrease as the sample size increases. This is because larger data sets are less impacted by individual samples/measurements and typically allow for greater accuracy. Uncertainty that arises from data gaps is addressed by applying models and assumptions. Models are applied because they represent a level of understanding to address certain exposure parameters that are impractical or impossible to measure (e.g., COPC concentrations in air that would result from construction activities that have not yet occurred—or may never occur—at the site). Assumptions represent an educated estimate to address information that is not available (e.g., additivity of carcinogens).

6.2 Sources of Uncertainty

The discussion in the following subsections provides an overview of uncertainty, with a focus on those sources that are most likely to affect interpretation of the risk assessment results.

6.2.1 Sample Selection

Soil samples were collected from within the former Coal Yard No. 3 area where coal was stored. The sample locations appear to be representative of the site, and no information suggests that the selection of these locations have introduced an identifiable bias.

6.2.2 Laboratory Analysis

State-of-the-practice EPA SW-846 laboratory methods were used for sample analysis (Shaw, 2013b). No laboratory analytical data quality issues were identified that affected the BHHRA results.

6.2.3 Exposure-Point Concentration Estimates

A UCL or the MDC is used as the EPC for data sets of five samples or more. The MDC is used for data sets with less than five samples. The surface soil data set has only four samples; therefore, the MDC was used as the EPC. Further, because no COPCs were identified in the subsurface soil, surface soil EPCs were conservatively used to represent total soil EPCs. This conservative assumption was made because the lack of COPCs in subsurface soil indicates that this medium was not impacted by former PBOW operations and should not be evaluated beyond the screening assessment.

The use of the surface soil MDCs as surface soil EPC values introduces a high bias because the MDC of this data set is likely to overestimate the average concentrations of COPCs in soil at Coal Yard No. 3. Additional uncertainty is introduced for total soil by using the surface soil MDCs as the total soil EPCs. Receptors evaluated for exposure to total soil (i.e., future groundskeeper, current/future construction worker, and hypothetical future resident) are normally expected and assumed to be exposed to a combination of surface and subsurface soil. Thus, the use of the surface soil EPCs effectively overestimates the exposure to surface soil. Please note that UCL concentrations provided in Table 2-5 for total soil are generally less than half the surface soil MDC.

It is also noted that uncertainty is introduced in the statistical approach used to calculate the UCLs. As stated in EPA (1989a), the average concentration of the site should be used as the concentration term. Generally, a UCL is used to account for the uncertainty of using a sample

data set to estimate the true population mean concentration for the site. ProUCL Version 4.1 software (EPA, 2011) was used to calculate the EPCs for those media with five or more samples. However, the general use of a UCL on all the data sets, even given uncertainty as to whether a given method provides full coverage at 95 percent confidence, would result in general overestimation of the population mean and associated risks. Therefore, as intended by the guidance (EPA, 1989a), the practice of using the UCL as the EPC (note that the MDC is used as the EPC if the UCL exceeds the MDC) introduces bias that tends to overestimate the population mean and the resultant risk values. As a result, the UCLs shown in Table 2-5 are likely overestimates of the true mean concentrations of the combined surface soil and subsurface soil data sets.

6.2.4 Land-Use Assumptions/Receptor Selection

The current groundskeeper is intended to represent an on-site worker under the current land use as NASA-controlled property. Because there is currently no identified NASA activity at Coal Yard No. 3, the use of this receptor likely overestimates risks and hazards to a current site worker. The assumed future use of the hunter and the hunter's child are reasonable, as other areas within PBOW may currently be legally hunted by permit. Unrestricted land use, including hypothetical future residential use, is a reasonable assumption for the future at Coal Yard No. 3, given the residential use of property adjacent to the PBOW facility. Because no development of the PBOW property is planned, each of the future scenarios is hypothetical and likely conservative.

6.2.5 Exposure Assumption Values

The exposure assumption values used in the exposure assessment (Table 3-1) are selected to represent either an upper bound (e.g., 95th percentile) or mid-range value, depending on the particular parameter. Mathematically combining these terms in exposure equations is generally thought to result in decidedly conservative exposure estimations (Cogliano, 1997; Burmaster and Harris, 1993). However, this conservativeness is associated with the state of risk assessment practice, which attempts to focus on the upper end of exposure possibilities rather than more realistic levels of exposure, and not on assumptions made specifically for Coal Yard No. 3.

6.2.6 Toxicity Assessment

Uncertainties associated with the toxicity assessment include those regarding development of the health effects criteria values, the classification of potential carcinogenicity, the extrapolation of exposure route-specific toxicity values to other routes of exposure, and the extrapolation of toxic effects observed in animal studies to potential adverse effects in humans. A general summary of these uncertainties is provided in the following paragraphs with respect to carcinogenicity.

The EPA weight-of-evidence classification system for carcinogens is used to examine and classify chemical agents with respect to their carcinogenic potential. Most EPA potential carcinogens are classified based on animal data, without sufficient human data to support a causal association (i.e., former Group B2; refer to Section 4.1). Also, the linearized multistage (LMS) mathematical model was used to extrapolate values from relatively high-dose rodent studies to relatively low-dose human exposures in the development of SFs for these compounds. This application of the LMS model is the subject of much controversy. Thus, the LMS approach used to develop SFs, combined with other assumptions, tends to overestimate potential risks.

Overall, the toxicity values, assuming similar effects between humans and test species, tend to result in overestimates of cancer risks. However, it is possible that a given chemical can elicit a toxic response in humans that is not observed in the laboratory species studied or that humans may be more sensitive to a given chemical. In this instance, it is possible for the use of the toxicity values to result in underestimates of risks.

6.2.7 Risk Characterization

It is assumed that the effects of simultaneous exposures to multiple carcinogens at a site are additive. However, chemicals in combination may act additively, synergistically, or antagonistically or may not influence one another at all. Therefore, depending on the interactive effects (if any), the risk characterization approach to multiple contaminants may lead to either underestimates or overestimates of potential risk.

6.2.8 Evaluation of Selected COPCs for Site Relatedness

As described in Section 2.4.3, a comparison of naturally occurring inorganics is performed in two steps. The first is a comparison to BSCs; a chemical whose MDC does not exceed the BSC is assumed to be related to background and thus eliminated from further evaluation. The second step is performed for selected inorganics and organic compounds during the risk characterization step, after exposure calculations are performed which include the potential background-related contributions as part of the overall ILCR and HI results. None of the COPCs are inorganics; thus, the second background evaluation step was not needed.

All of the Coal Yard No. 3 COPCs are PAHs, which are ubiquitous compounds that are associated with incomplete combustion and petroleum hydrocarbons. They are also found in coal; therefore, it is reasonable to assume that they are site related. However, given their ubiquitous nature, the assumption that 100 percent of the PAHs present in Coal Yard No. 3 soil are related to former site activities may add a conservative bias.

7.0 Summary and Conclusions

7.1 Summary

This BHHRA addendum was conducted to evaluate cancer risk and noncancer hazards associated with Coal Yard No. 3 surface soil and subsurface soil. It is noted that this BHHRA addendum, including the evaluation of future uses, was conducted to meet administrative requirements, including FUDS regulations (USACE, 2004). Exposure and risk/hazard associated with the COPCs were evaluated using the following receptors (media evaluated in parentheses):

- Current groundskeeper (surface soil)
- Future groundskeeper (total soil)
- Future indoor worker (surface soil, subsurface soil [inhalation pathway only])
- Current/future construction worker (total soil)
- Hypothetical future resident (total soil)
- Future adult hunter (surface soil, including venison pathway)
- Future hunter's child (surface soil [venison pathway only]).

None of the COPCs has recognized noncancer effects. Therefore, the noncancer hazards of Coal Yard No. 3 soil are regarded as negligible for all receptors. The overall ILCR values are summarized in the following bullets:

- Current groundskeeper: ILCR = 3E-6.
- Future groundskeeper: ILCR = 3E-6.
- Future indoor worker: ILCR = 8E-7.
- Construction worker: ILCR = 6E-8.
- Hypothetical future resident: ILCR = 9E-6.
- Future hunter: ILCR = 2E-7.
- Future hunter's child: None of the carcinogenic COPCs are bioaccumulative; cancer risks are assumed to be de minimis.

No construction is currently planned at Coal Yard No. 3, and no groundskeeping of any sort appears to be occurring at Coal Yard No. 3. Each of the future scenarios are hypothetical and likely conservative.

The current groundskeeper is intended to represent an on-site worker under the current land use as NASA-controlled property. Because there is currently no identified NASA activity at Coal

Yard No. 3, the use of the current groundskeeper, which assumes a full-time, 25-year employee who works exclusively at the Coal Yard No. 3 for 250 days per year, represents an extreme overestimate of exposure to any current receptor. Because no development of the PBOW property is planned and no hunting is currently allowed, all of the future scenarios are hypothetical and likely conservative.

7.2 Conclusions

The ILCR values for each of the Coal Yard No. 3 exposure scenarios are within or less than the NCP risk management range, and all are less than the PBOW cancer risk goal of 1E-5. None of the COPCs have recognized noncancer effects; therefore, the noncancer hazards associated with exposure to site-related chemicals in Coal Yard No. 3 soil are regarded as negligible.

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TABLES

Table 2-1

Soil Sample Summary
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works
Sandusky, Ohio

Sample Location	Sample Number	Sample Purpose	Sample Date	Depth of Sample (ft bgs)			Analysis
Surface Soil							
CY3-SB01	CY0031	REG	12/19/2011	0.2	-	1.2	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB02	CY0036	REG	12/19/2011	1.5	-	2.5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB03	CY0039	REG	12/19/2011	0	-	1	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB04	CY0042	REG	12/19/2011	0	-	1	Explosives, Gen Chem, Metals, PCB, SVOC
Subsurface Soil							
CY3-SB01	CY0032	REG	12/19/2011	3	-	5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB01	CY0033	FD	12/19/2011	3	-	5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB01	CY0035	REG	12/19/2011	8	-	10	Explosives, Gen Chem, Metals, SVOC
CY3-SB02	CY0037	REG	12/19/2011	3	-	5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB02	CY0038	REG	12/19/2011	8	-	10	Explosives, Gen Chem, Metals, SVOC
CY3-SB03	CY0040	REG	12/19/2011	3	-	5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB03	CY0041	REG	12/19/2011	8	-	10	Explosives, Gen Chem, Metals, SVOC
CY3-SB04	CY0043	REG	12/19/2011	3	-	5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB04	CY0044	REG	12/19/2011	8	-	10	Explosives, Gen Chem, Metals, SVOC

ft bgs - Feet below ground surface.
FD - Field duplicate; averaged with regular sample.
Gen Chem - General chemistry.
PCB - Polychlorinated biphenyls.
REG - Regular sample.
SVOC - Semivolatile organic compounds.

Table 2-2

Background Screening Concentrations of Inorganics in Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works
Sandusky, Ohio

Chemical Name (mg/kg)	Frequency of Detection	Range of Detected Concentrations	Range of Reporting Limits [a]	Statistical Distribution	Arithmetic Mean	95% UTL [b]	Background Screening Concentration [c]
Aluminum	12 / 12	3520 - 15500	22.6 - 26.5	L	8.43E+03	2.69E+04	15500
Antimony	9 / 25	5.9 - 9.3	5.4 - 8.0	NP	4.68E+00	NA	9.30
Arsenic	23 / 26	2.1 - 36.5	1.1 - 24.7	L	1.08E+01	7.10E+01	36.5
Barium	9 / 12	35.6 - 826	22.6 - 26.5	L	1.16E+02	1.30E+03	826
Beryllium	6 / 25	0.57 - 1	0.57 - 1.2	L	5.65E-01	1.17E+00	1.00
Cadmium	0 / 25	NA	0.57 1.2	L	4.49E-01	NA	NA
Calcium	12 / 12	735 - 52300	566 - 663	L	1.13E+04	2.18E+05	52300
Chromium	25 / 26	4.4 - 29	1.1 - 12.3	NP	1.34E+01	NA	29.0
Cobalt	9 / 12	9.6 - 116	5.7 - 61.7	L	2.26E+01	2.48E+02	116
Copper	23 / 26	2.3 - 56.2	2.2 - 3.3	L	1.70E+01	1.47E+02	56.2
Iron	12 / 12	5880 - 234000	11.3 - 123	L	4.01E+04	3.58E+05	234000
Lead	26 / 26	1.9 - 48.6	0.34 - 7.4	L	1.28E+01	5.13E+01	48.6
Magnesium	12 / 12	629 - 10400	566 - 663	L	3.26E+03	3.08E+04	10400
Manganese	26 / 26	21 - 13300	1.7 - 18.5	L	7.29E+02	3.51E+03	3506
Mercury	2 / 26	0.085 - 0.085	0.037 - 0.3	L	9.06E-02	5.60E-01	0.085
Nickel	26 / 26	5.4 - 55.1	4.5 - 5.3	L	2.28E+01	7.79E+01	55.1
Potassium	11 / 12	579 - 3390	566 - 663	L	1.24E+03	6.08E+03	3390
Selenium	5 / 25	0.61 - 2	0.57 - 4.9	NP	1.55E+00	NA	2.00
Silver	2 / 26	1.1 - 11.1	1.1 - 1.3	NP	1.00E+00	NA	11.1
Sodium	0 / 12	NA	566 - 663	L	3.03E+02	NA	NA
Thallium	2 / 25	1.2 - 1.3	1.1 - 6.1	NP	1.91E+00	NA	1.30
Vanadium	11 / 12	9 - 40.9	5.7 - 61.7	L	2.48E+01	8.31E+01	40.9
Zinc	26 / 26	6.6 - 655	0.57 - 12.3	L	7.30E+01	3.22E+02	322

L - Lognormal; mg/kg - milligrams per kilogram; NP - nonparametric; NA - not applicable; not available.

[a] A single background sample had to be diluted such that the reporting limits of this sample (BCG-SB01, 6990) were elevated 10 or 20 times higher than they would have been if not diluted. This affects the maximum reporting limit shown for arsenic, chromium, cobalt, iron, lead, manganese, and vanadium. Reporting limits for these analytes in all other samples were much lower, approximately by an order of magnitude or more in each case.

[b] 95% UTL - 95% upper tolerance limit calculated as described in IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio, August.*

[c] The maximum detected concentration is used as the background screening criterion for nonparametric data sets; for normal or lognormal data sets, the 95% UTL or the maximum detected concentration, whichever is less, is used. This approach was agreed upon for all future Plum Brook Ordnance Works (PBOW) risk assessments by the PBOW Project Delivery Team (PDT) during the May 10, 2000 PDT meeting.

Note: Reporting limits from sample 6990 were deleted when calculating results for antimony, beryllium, cadmium, selenium, and thallium. The reporting limits were elevated by dilution factors which greatly exceed any detected concentration and would bias results unrealistically high.

Source: IT, 2001, TNT Areas A and C Remedial Investigation, Volume 2 Baseline Human Health Risk Assessment, Final, Former Plum Brook Ordnance Works, Sandusky, Ohio ,November, and reports referenced therein, including IT (1998).

Table 2-3

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Method Detection Limit Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	EPC[e] mg/kg
Inorganics														
Aluminum	4 / 4	100	4.13E+03		7.11E+03		7.30E-01	1.80E+00	5.42E+03	1.55E+04	7700		N (b)	
Arsenic	4 / 4	100	3.60E+00		8.80E+00		3.70E-02	8.80E-02	6.13E+00	3.65E+01	0.39		N (b)	
Barium	4 / 4	100	1.93E+01		4.47E+01		3.70E-02	8.80E-02	3.60E+01	8.26E+02	1500		N (b)	
Beryllium	4 / 4	100	1.90E-01	J	4.20E-01	J	3.70E-03	8.80E-03	2.90E-01	1.00E+00	16		N (b)	
Cadmium	3 / 4	75	1.40E-01	J	1.80E-01	J	7.30E-03	2.00E-02	1.25E-01	NA	7		N (b)	
Calcium	4 / 4	100	2.02E+04		6.80E+04		3.70E+00	9.80E+00	3.96E+04	5.23E+04	Nutrient		N (c)	
Chromium	4 / 4	100	6.70E+00		1.03E+01		7.30E-02	2.00E-01	8.80E+00	2.90E+01	0.29		N (b)	
Cobalt	4 / 4	100	2.70E+00		8.10E+00		3.70E-02	8.80E-02	5.55E+00	1.16E+02	2.3		N (b)	
Copper	4 / 4	100	7.40E+00		1.52E+01		3.70E-02	8.80E-02	1.23E+01	5.62E+01	310		N (b)	
Iron	4 / 4	100	6.48E+03		1.45E+04		1.20E+00	3.00E+00	1.05E+04	2.34E+05	5500		N (b)	
Lead	4 / 4	100	5.80E+00		1.10E+01		4.40E-02	2.00E-01	9.18E+00	4.86E+01	400		N (b)	
Magnesium	4 / 4	100	5.02E+03		1.09E+04		1.80E+00	4.40E+00	7.81E+03	1.04E+04	Nutrient		N (c)	
Manganese	4 / 4	100	2.36E+02		3.25E+02		3.70E-02	8.80E-02	2.79E+02	3.51E+03	180		N (b)	
Mercury	4 / 4	100	1.80E-02	J	3.00E-02	J	6.50E-03	7.10E-03	2.43E-02	8.50E-02	2.3		N (b)	
Nickel	4 / 4	100	5.80E+00		1.98E+01		3.70E-02	8.80E-02	1.38E+01	5.51E+01	150		N (b)	
Potassium	4 / 4	100	2.73E+02	J	9.21E+02		1.80E+00	4.40E+00	6.27E+02	3.39E+03	Nutrient		N (c)	
Sodium	3 / 4	75	5.70E+01	J	9.21E+01	J	2.70E+01	6.60E+01	7.13E+01	NA	Nutrient		N (c)	
Vanadium	4 / 4	100	1.06E+01		1.62E+01		3.70E-02	8.80E-02	1.28E+01	4.09E+01	39		N (b)	
Zinc	4 / 4	100	1.46E+01		4.89E+01		7.30E-02	2.00E-01	3.39E+01	3.22E+02	2300		N (b)	
Semivolatile Organic Compounds														
Acenaphthylene	2 / 4	50	6.19E-02	J	6.57E-02	J	1.90E-02	2.00E-02	4.19E-02		340	f	N (a)	
Anthracene	2 / 4	50	7.38E-02	J	1.71E-01	J	1.90E-02	2.00E-02	7.12E-02		1700		N (a)	
Benzo(a)anthracene	3 / 4	75	3.66E-02	J	4.07E-01		1.90E-02	2.00E-02	2.03E-01		0.15		Y	0.407
Benzo(a)pyrene	3 / 4	75	3.20E-02	J	4.03E-01		1.90E-02	2.00E-02	1.95E-01		0.015		Y	0.403
Benzo(b)fluoranthene	3 / 4	75	2.91E-02	J	5.82E-01		1.90E-02	2.00E-02	2.61E-01		0.15		Y	0.582
Benzo(ghi)perylene	3 / 4	75	2.24E-02	J	2.77E-01		1.90E-02	2.00E-02	1.31E-01		170	g	N (a)	
Benzo(k)fluoranthene	3 / 4	75	2.69E-02	J	1.88E-01	J	1.90E-02	2.00E-02	9.95E-02		1.5		N (a)	
Chrysene	3 / 4	75	4.06E-02	J	4.43E-01		1.90E-02	2.00E-02	2.23E-01		15		N (a)	
Dibenz(a,h)anthracene	2 / 4	50	4.16E-02	J	5.89E-02	J	1.90E-02	2.00E-02	3.51E-02		0.015		Y	0.0589
Fluoranthene	3 / 4	75	5.25E-02	J	8.43E-01		1.90E-02	2.00E-02	3.94E-01		230		N (a)	
Indeno(1,2,3-cd)pyrene	3 / 4	75	2.55E-02	J	2.94E-01		1.90E-02	2.00E-02	1.41E-01		0.15		Y	0.294
Methylnaphthalene, 2-	1 / 4	25	2.10E-02	J	2.10E-02	J	1.90E-02	2.00E-02	2.00E-02		23		N (a)	
Phenanthrene	3 / 4	75	2.78E-02	J	4.15E-01		1.90E-02	2.00E-02	1.78E-01		170	g	N (a)	
Pyrene	3 / 4	75	4.38E-02	J	6.36E-01		1.90E-02	2.00E-02	3.02E-01		170		N (a)	

Table 2-3

Statistical Summary and Selection of Chemicals of Potential Concern in Surface Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg										
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]		EPC[e]
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]	mg/kg

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas*, *Plum Brook Ordnance Works, Sandusky, Ohio*, August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = Maximum detected concentration is less than the RBSC.
(b) = Maximum detected concentration is less than the BSC.
(c) = Essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] The maximum detected concentration is used as the exposure point concentration (EPC) because the data sets have fewer than five samples.
[f] RBSC based on acenapthene.
[g] RBSC based on pyrene.

Table 2-4

Statistical Summary and Selection of Chemicals of Potential Concern in Subsurface Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg									
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]	
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]
Inorganics												
Aluminum	8 / 8	100	6.04E+03		1.14E+04		9.30E-01	5.50E+00	7.79E+03	1.55E+04	7700	N (b)
Antimony	2 / 8	25	1.50E-01	J	2.90E-01	J	5.00E-02	2.75E-01	1.49E-01	9.30E+00	3.1	N (b)
Arsenic	8 / 8	100	3.70E+00	J	1.08E+01		4.60E-02	2.75E-01	7.01E+00	3.65E+01	0.39	N (b)
Barium	8 / 8	100	4.61E+01		6.75E+01		4.60E-02	2.75E-01	5.65E+01	8.26E+02	1500	N (b)
Beryllium	8 / 8	100	3.00E-01		6.55E-01	J	4.60E-03	2.75E-02	4.31E-01	1.00E+00	16	N (b)
Cadmium	5 / 8	63	1.10E-01	J	6.10E-01		5.00E-03	2.75E-02	2.07E-01	NA	7	N (b)
Calcium	8 / 8	100	2.34E+03		4.27E+04		2.50E+00	1.40E+01	1.71E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	9.10E+00	J	1.64E+01		5.00E-02	2.75E-01	1.19E+01	2.90E+01	0.29	N (b)
Cobalt	8 / 8	100	3.60E+00	J	9.00E+00		4.60E-02	2.75E-01	6.44E+00	1.16E+02	2.3	N (b)
Copper	8 / 8	100	1.05E+01	J	1.89E+01		4.60E-02	2.75E-01	1.46E+01	5.62E+01	310	N (b)
Iron	8 / 8	100	9.52E+03	J	2.23E+04		1.60E+00	9.55E+00	1.43E+04	2.34E+05	5500	N (b)
Lead	8 / 8	100	9.15E+00		1.28E+01		4.70E-02	1.10E-01	9.93E+00	4.86E+01	400	N (b)
Magnesium	8 / 8	100	1.45E+03	J	1.29E+04		2.30E+00	1.40E+01	5.98E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.58E+02	J	4.36E+02		4.60E-02	2.75E-01	3.12E+02	3.51E+03	180	N (b)
Mercury	8 / 8	100	1.30E-02	J	5.00E-02	J	6.50E-03	7.80E-03	2.76E-02	8.50E-02	2.3	N (b)
Nickel	8 / 8	100	8.80E+00	J	2.18E+01		4.60E-02	2.75E-01	1.66E+01	5.51E+01	150	N (b)
Potassium	8 / 8	100	3.87E+02	J	1.01E+03		2.30E+00	1.40E+01	6.69E+02	3.39E+03	Nutrient	N (c)
Sodium	4 / 8	50	5.57E+01	J	9.15E+01	J	3.50E+01	2.05E+02	9.00E+01	NA	Nutrient	N (c)
Vanadium	8 / 8	100	1.22E+01		3.04E+01		4.60E-02	2.75E-01	1.91E+01	4.09E+01	39	N (b)
Zinc	8 / 8	100	2.59E+01	J	4.85E+01		5.00E-02	2.75E-01	3.68E+01	3.22E+02	2300	N (b)

BSC - Background screening concentration.
COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk based screening concentration.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = Maximum detected concentration is less than the RBSC.
(b) = Maximum detected concentration is less than the BSC.
(c) = Essential nutrient.
[d] Y = Chemical is chosen as COPC.

Table 2-5

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum	VQ	Maximum	VQ	Method Detection Limit Minimum	Maximum	Mean mg/kg	BSC [a] mg/kg	RBSC [b] mg/kg		COPC? [c,d]	95% UCL [e] mg/kg	EPC [f] mg/kg
Inorganics															
Aluminum	12 / 12	100	4.13E+03		1.14E+04		7.30E-01	5.50E+00	7.00E+03	1.55E+04	7700		N (b)		
Antimony	2 / 12	17	1.50E-01	J	2.90E-01	J	5.00E-02	2.75E-01	1.37E-01	9.30E+00	3.1		N (b)		
Arsenic	12 / 12	100	3.60E+00		1.08E+01		3.70E-02	2.75E-01	6.72E+00	3.65E+01	0.39		N (b)		
Barium	12 / 12	100	1.93E+01		6.75E+01		3.70E-02	2.75E-01	4.97E+01	8.26E+02	1500		N (b)		
Beryllium	12 / 12	100	1.90E-01	J	6.55E-01	J	3.70E-03	2.75E-02	3.84E-01	1.00E+00	16		N (b)		
Cadmium	8 / 12	67	1.10E-01	J	6.10E-01		5.00E-03	2.75E-02	1.80E-01	NA	7		N (b)		
Calcium	12 / 12	100	2.34E+03		6.80E+04		2.50E+00	1.40E+01	2.46E+04	5.23E+04	Nutrient		N (c)		
Chromium	12 / 12	100	6.70E+00		1.64E+01		5.00E-02	2.75E-01	1.09E+01	2.90E+01	0.29		N (b)		
Cobalt	12 / 12	100	2.70E+00		9.00E+00		3.70E-02	2.75E-01	6.14E+00	1.16E+02	2.3		N (b)		
Copper	12 / 12	100	7.40E+00		1.89E+01		3.70E-02	2.75E-01	1.39E+01	5.62E+01	310		N (b)		
Iron	12 / 12	100	6.48E+03		2.23E+04		1.20E+00	9.55E+00	1.30E+04	2.34E+05	5500		N (b)		
Lead	12 / 12	100	5.80E+00		1.28E+01		4.40E-02	2.00E-01	9.68E+00	4.86E+01	400		N (b)		
Magnesium	12 / 12	100	1.45E+03	J	1.29E+04		1.80E+00	1.40E+01	6.59E+03	1.04E+04	Nutrient		N (c)		
Manganese	12 / 12	100	1.58E+02	J	4.36E+02		3.70E-02	2.75E-01	3.01E+02	3.51E+03	180		N (b)		
Mercury	12 / 12	100	1.30E-02	J	5.00E-02	J	6.50E-03	7.80E-03	2.65E-02	8.50E-02	2.3		N (b)		
Nickel	12 / 12	100	5.80E+00		2.18E+01		3.70E-02	2.75E-01	1.57E+01	5.51E+01	150		N (b)		
Potassium	12 / 12	100	2.73E+02	J	1.01E+03		1.80E+00	1.40E+01	6.55E+02	3.39E+03	Nutrient		N (c)		
Sodium	7 / 12	58	5.57E+01	J	9.21E+01	J	2.70E+01	2.05E+02	8.38E+01	NA	Nutrient		N (c)		
Vanadium	12 / 12	100	1.06E+01		3.04E+01		3.70E-02	2.75E-01	1.70E+01	4.09E+01	39		N (b)		
Zinc	12 / 12	100	1.46E+01		4.89E+01		5.00E-02	2.75E-01	3.58E+01	3.22E+02	2300		N (b)		
Semivolatile Organic Compounds															
Acenaphthylene	2 / 12	17	6.19E-02	J	6.57E-02	J	1.90E-02	2.20E-02	2.78E-02		340	g	N (a)		
Anthracene	2 / 12	17	7.38E-02	J	1.71E-01	J	1.90E-02	2.20E-02	3.76E-02		1700		N (a)		
Benzo(a)anthracene	3 / 12	25	3.66E-02	J	4.07E-01		1.90E-02	2.20E-02	8.15E-02		0.15		Y	0.174	0.407
Benzo(a)pyrene	3 / 12	25	3.20E-02	J	4.03E-01		1.90E-02	2.20E-02	7.89E-02		0.015		Y	0.167	0.403
Benzo(b)fluoranthene	3 / 12	25	2.91E-02	J	5.82E-01		1.90E-02	2.20E-02	1.01E-01		0.15		Y	0.220	0.582
Benzo(ghi)perylene	3 / 12	25	2.24E-02	J	2.77E-01		1.90E-02	2.20E-02	5.74E-02		170	h	N (a)		
Benzo(k)fluoranthene	3 / 12	25	2.69E-02	J	1.88E-01	J	1.90E-02	2.20E-02	4.70E-02		1.5		N (a)		
Chrysene	3 / 12	25	4.06E-02	J	4.43E-01		1.90E-02	2.20E-02	8.81E-02		15		N (a)		
Dibenz(a,h)anthracene	2 / 12	17	4.16E-02	J	5.89E-02	J	1.90E-02	2.20E-02	2.55E-02		0.015		Y	0.0465	0.0589
Fluoranthene	3 / 12	25	5.25E-02	J	8.43E-01		1.90E-02	2.20E-02	1.45E-01		230		N (a)		
Indeno(1,2,3-cd)pyrene	3 / 12	25	2.55E-02	J	2.94E-01		1.90E-02	2.20E-02	6.07E-02		0.15		Y	0.120	0.294
Methylnaphthalene, 2-	1 / 12	8	2.10E-02	J	2.10E-02	J	1.90E-02	2.20E-02	2.05E-02		23		N (a)		
Phenanthrene	3 / 12	25	2.78E-02	J	4.15E-01		1.90E-02	2.20E-02	7.32E-02		170	h	N (a)		
Pyrene	3 / 12	25	4.38E-02	J	6.36E-01		1.90E-02	2.20E-02	1.14E-01		170		N (a)		

BSC - Background screening concentration.

Table 2-5

Statistical Summary and Selection of Chemicals of Potential Concern in Total Soil
Coal Yard No. 3 Baseline Human Health Risk Assessment
Former Plum Brook Ordnance Works, Sandusky, Ohio

			Range of Values, mg/kg											
	Detection	Percent	Detected Concentrations				Method Detection Limit		Mean	BSC [a]	RBSC [b]		95% UCL [e]	EPC [f]
Chemical	Frequency	Detection	Minimum	VQ	Maximum	VQ	Minimum	Maximum	mg/kg	mg/kg	mg/kg	COPC? [c,d]	mg/kg	mg/kg

COPC - Chemical of potential concern.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
RBSC - Risk-based screening concentration.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio* , August.
[b] Risk-based screening concentrations based on EPA Regional Screening Level Table (November 2012) residential soil values and are based on a risk level of 1.0E-06 and a hazard index of 0.1.
[c] N = Chemical is not chosen as a COPC:
(a) = Maximum detected concentration is less than the RBSC.
(b) = Maximum detected concentration is less than the BSC.
(c) = Essential nutrient.
[d] Y = Chemical is chosen as COPC.
[e] 95% upper confidence limit of the aritmetic mean of the total soil data set (i.e., combined surface and subsurface soil data sets). Calculated for COPCs only.
[f] Because no COPCs were detected in the subsurface soil, only the surface soil EPCs were used for total soil. Please refer to Section 2.5 of the text.
[g] RBSC based on acenapthene.
[h] RBSC based on pyrene.

Table 3-1

Receptor/Exposure Scenarios
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Groundskeeper – Current			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation[a]
Subsurface Soil	Not Quantified[b]		
Groundwater	Not Quantified[c]		
Groundskeeper – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	Not Quantified[e]		
Indoor Worker – Future[f]			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact[a]
	Dust Emissions; Volatilization	Indoor Air	Inhalation[a]
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	Not Quantified[e]		

Table 3-1

Receptor/Exposure Scenarios
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Source Medium	Model	Exposure Medium	Exposure Route
Construction Worker – Current/Future			
Total Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Activity	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Groundwater	Not Quantified[b]		
On-Site Resident – Future			
Total Soil[d]	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions Based on Wind Erosion	Ambient Air	Inhalation
	Volatilization from Soil	Ambient Air	Inhalation
Subsurface Soil	Volatilization from Soil	Indoor Air	Inhalation
Groundwater	Not Quantified[e]		
Hunter – Current/Future			
Surface Soil	None	Soil	Incidental Ingestion
			Dermal Contact
	Dust Emissions, Volatilization	Ambient Air	Inhalation[a]
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[c]		
Hunter's Child – Current/Future			
Surface Soil	Not Quantified[c]		
	Not Quantified[c]		
	Biouptake	Venison	Venison Consumption
Subsurface Soil	Not Quantified[c]		

[a] Although theoretically complete, this pathway is not quantified as explained in text.

[b] Although contact with this medium is possible, exposure would be sporadic, rather than continuous or predictable. Such exposures do not lend themselves to evaluation under the chronic toxicity paradigm used in a baseline risk assessment.

[c] There is no plausible pathway for exposure.

Table 3-1

Receptor/Exposure Scenarios
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

[d]Total soil represents a mixture of surface and subsurface soil. This is assumed for future scenarios where excavation and regrading is assumed to take place.

[e]Groundwater in the area was evaluated in the Ash Pit No. 3 baseline human health risk assessment.

[f] Even though the mixing of surface and subsurface soil described in footnote “d” might otherwise be applicable, this receptor was selected primarily to evaluate exposure to indoor air resulting from subsurface soil contamination. Surface soil was used for direct contact exposure to avoid potential “double counting” of contaminants in subsurface soil (refer to Section 3.1.3.2 of text).

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
General Variables Used in All Intake Models					
Body weight (BW), kg	70[a]	70[a]	Child: 15[a] Adult: 70[a]	70[a]	Child: 15[a] Adult: 70[a]
Averaging time, noncancer (AT), days[b]	9125	183	Child: 2190 Adult: 8760	9125	Child: 2190 Adult: 10950
Averaging time, cancer (AT), days[b]	25550	25550	25550	25550	25550
Inhalation of VOCs and Resuspended Dust from Surface Soil, Total Soil or Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	1[c]	1[c]	1[c]	NA	NA
Inhalation rate (IR_a), m^3/day	20[d]	20[d]	Child: 10[e] Adult: 20[d]	NA	NA
Exposure frequency (EF), days/year	250[d]	250[c]	350[a]	NA	NA
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	NA	NA
Inhalation of VOCs in Indoor Air from Subsurface Soil					
Fraction exposed to contaminated medium (FI_a), unitless	NA	NA	1[c]	1[c]	NA
Inhalation rate (IR_a), m^3/day	NA	NA	Child: 10[e] Adult: 20[d]	20[d]	NA
Exposure frequency (EF), days/year	NA	NA	350[a]	250[a]	NA
Exposure duration (ED), years	NA	NA	Child: 6[a] Adult: 24[a]	25[a]	NA
Incidental Ingestion of Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	1[c]	1[c]	1[c]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Pathway Variable	Grounds-keeper	Construction Worker	On-Site Resident	Indoor Worker	Hunter and Hunter's Child
Soil incidental ingestion rate (IR_{so}), mg/day	100[a]	330[a]	Child: 200[a] Adult: 100[a]	50[a]	Child: NA Adult: 100[a]
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	250[a]	14[d]
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	25[a]	30[a]
Dermal Contact with Soil					
Fraction exposed to contaminated medium (FI_{so}), unitless	1[c]	1[c]	1[c]	NA	1[c]
Body surface area exposed to soil (SA_{so}), cm^2	3,300[g]	3,300[g]	Child: 2,800[f] Adult: 5,700[f]	NA	Child: NA Adult: 3,300[c]
Soil-to-skin adherence factor (AF_{so}), mg/cm^2	0.2[g]	0.3[g]	Child: 0.2[f] Adult: 0.07[f]	NA	0.2[c]
Dermal absorption factor (ABS), unitless	csv	csv	csv	NA	csv
Exposure frequency (EF), days/year	250[d]	250[a]	350[a]	NA	14[c]
Exposure duration (ED), years	25[a]	0.5[c]	Child: 6[a] Adult: 24[a]	NA	30[a]
Venison Consumption					
Venison ingestion rate (IR_v), kg/day	NA	NA	NA	NA	Child: 0.005[c] Adult: 0.013[c]
Exposure frequency (EF), days/year	NA	NA	NA	NA	350[a]
Exposure duration (ED), years	NA	NA	NA	NA	Child: 6[a] Adult: 30[c]

Table 3-2

Variables Used to Estimate Potential Chemical Intakes and Contact Rates for Receptors
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

[a] U.S. Environmental Protection Agency (EPA), 2002, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, Office of Solid Waste and Emergency Response, Washington, DC, 9355.4-24, December.

[b] For noncancer evaluation, calculated as the product of ED (years) x 365 days/year; for cancer evaluation, calculated as the product of 70 years (assumed human lifetime) x 365 days/year. Source: U.S. Environmental Protection Agency (EPA), 1989a, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, Interim Final, Office of Emergency and Remedial Response, Washington, D.C., EPA/540/1-89/002.

[c] Assumed; see text.

[d] U.S. Environmental Protection Agency (EPA), 1991, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.603.

[e] U.S. Environmental Protection Agency (EPA), 2004a, *User's Guide and Background Technical Document for Region 9 Preliminary Remediation Goals (PRG) Table*, Region 9, San Francisco, California, October, <http://www.epa.gov/region09/waste/sfund /prg/files/04usersguide.pdf>.

[f] U.S. Environmental Protection Agency (EPA), 2004b, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)*, Final, Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-99/005, July.

csv – Chemical-specific value.
NA – Pathway not applicable for receptor.

Table 3-3

Physical Properties of Chemicals of Potential Concern[a]
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical of Potential Concern	Soil-to-forage Biotransfer Factor B_p (unitless)	Biotransfer Factor for Beef B_b (days/kg)	Biotransfer Factor for Venison B_v (unitless)	Diffusivity In Air (D_i) (cm^2/second)	Soil Organic Carbon-Water Partition Coefficient K_{oc} (cm^3/g)	log K_{ow}	Absorption Fraction ABS (unitless)	Permeability Coefficient K_p (cm/hour)	*tau* (hour/event)	*t** (hour)	Fraction Absorbed from Water FA (unitless)	B (unitless)	Molecular Weight (g/mole)	Henry's Law Constant (atm-m^3/mole)
Semivolatile Organic Compounds														
Benzo(a)anthracene	NA	NA	NA	5.10E-02	3.98E+05	5.66E+00	0.13	4.70E-01	2.03	8.53	1	2.8	228.3	3.34E-06
Benzo(a)pyrene	NA	NA	NA	4.30E-02	1.02E+06	6.10E+00	0.13	7.00E-01	2.69	11.67	1	4.3	252.3	4.57E-07
Benzo(b)fluoranthene	NA	NA	NA	2.26E-02	1.23E+06	6.12E+00	0.13	7.00E-01	2.77	12.03	1	4.3	252.3	6.57E-07
Dibenz(a,h)anthracene	NA	NA	NA	2.02E-02	4.74E+05	6.75E+00	0.13	1.50E+00	3.88	17.57	0.6	9.7	278.4	1.41E-07
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.90E-02	3.47E+06	6.58E+00	0.13	1.00E+00	3.78	16.83	0.6	6.7	276.3	1.60E-06

tau - Lag time associated with rate at which chemical crosses stratum corneum per event.
t* - Time for absorption across the stratum corneum to reach steady state ; equals 2.4 times tau.
B - Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.
kg - Kilogram.
g - Gram.
atm-m^3 - Atmospheres per cubic meter.

[a] See Appendix C of the Ash Pit 3 Baseline Human Health Risk Assessment, which provides references for these values.

Table 4-1

Summary of Toxicity Assessment [a]
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical of Potential Concern	GAF	Weight of Evidence	Oral Slope Factor (mg/kg-day) $^{-1}$	Dermal Slope Factor (mg/kg-day) $^{-1}$	Weight of Evidence	Inhalation Unit Risk (µg/m^3) $^{-1}$	Inhalation Slope Factor (mg/kg-day) $^{-1}$
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Benzo(a)pyrene	1	B2	7.30E+00	7.30E+00	B2	8.80E-04	3.10E+00
Benzo(b)fluoranthene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01
Dibenz(a,h)anthracene	1	B2	7.30E+00	7.30E+00	B2	8.80E-04	3.10E+00
Indeno(1,2,3-cd)pyrene	1	B2	7.30E-01	7.30E-01	B2	8.80E-05	3.10E-01

Table 4-1

Summary of Toxicity Assessment [a]
Coal Yard No. 3 Baseline Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Oral		Dermal	Reference	Inhalation	
Chemical of Potential Concern	GAF	Reference Dose mg/kg-day	Target Organs	Reference Dose mg/kg-day	Concentration mg/m^3	Reference Dose mg/kg-day	Target Organs
Semivolatile Organic Compounds							
Benzo(a)anthracene	1	ND	NA	NA	ND	NA	NA
Benzo(a)pyrene	1	ND	NA	NA	ND	NA	NA
Benzo(b)fluoranthene	1	ND	NA	NA	ND	NA	NA
Dibenz(a,h)anthracene	1	ND	NA	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	1	ND	NA	NA	ND	NA	NA

mg/kg-day - Milligrams per kilogram-day.
$\mu g/m^3$ - Micrograms per cubic meter.
GAF - Gastrointestinal absorption factor.
NA - not available or not applicable.
ND - No data or not determined.
[a] See Appendix C of the Ash Pit 3 Baseline Human Health Risk Assessment, which provides references for these values.

Weight of Evidence EPA Group:
A - Carcinogenic to humans.
B - Likely to be carcinogenic to humans (includes both the former B1 and B2 probable human carcinogens as classified on IRIS).
C - Suggested evidence of carcinogenic potential.
D - Inadequate evidence to assess carcinogenic potential.

Table 5-1

Summary of Risk for All Receptors
Coal Yard No. 3 Human Health Risk Assessment Addendum
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Current/Future Groundskeeper		Current/Future Construction Worker		Future Indoor Worker		Future Resident			Future Hunter		Future Hunter's Child	
	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total HI	Total ILCR	Total Adult - HI	Total Child - HI	Total ILCR	Total HI	Total ILCR	Total HI
Overburden Groundwater Use													
Exposure Media													
Surface Soil	2.81E-06	NA	NE	NE	7.53E-07	NA	NE	NE	NE	1.88E-07	NA	NA	NA
Total Soil [a]	2.81E-06	NA	1.39E-07	NA	NE	NE	8.84E-06	NA	NA	NE	NE	NE	NE
Total ILCR or HI	**3E-06**	**NA**	**1E-07**	**NA**	**8E-07**	**NA**	**9E-06**	**NA**	**NA**	**2E-07**	**NA**	**NA**	**NA**

HI - Hazard index.
ILCR - Incremental lifetime cancer risk.
NA - No chemicals of potential concern available for exposure evaluation.
NE - Pathway not evaluated for this receptor.

Note:
[a] Total soil ILCR and HI values are based on use of surface soil maximum detected concetrations as exposure-point concentration values (see Section 2.5 of the text for further information).

FIGURES

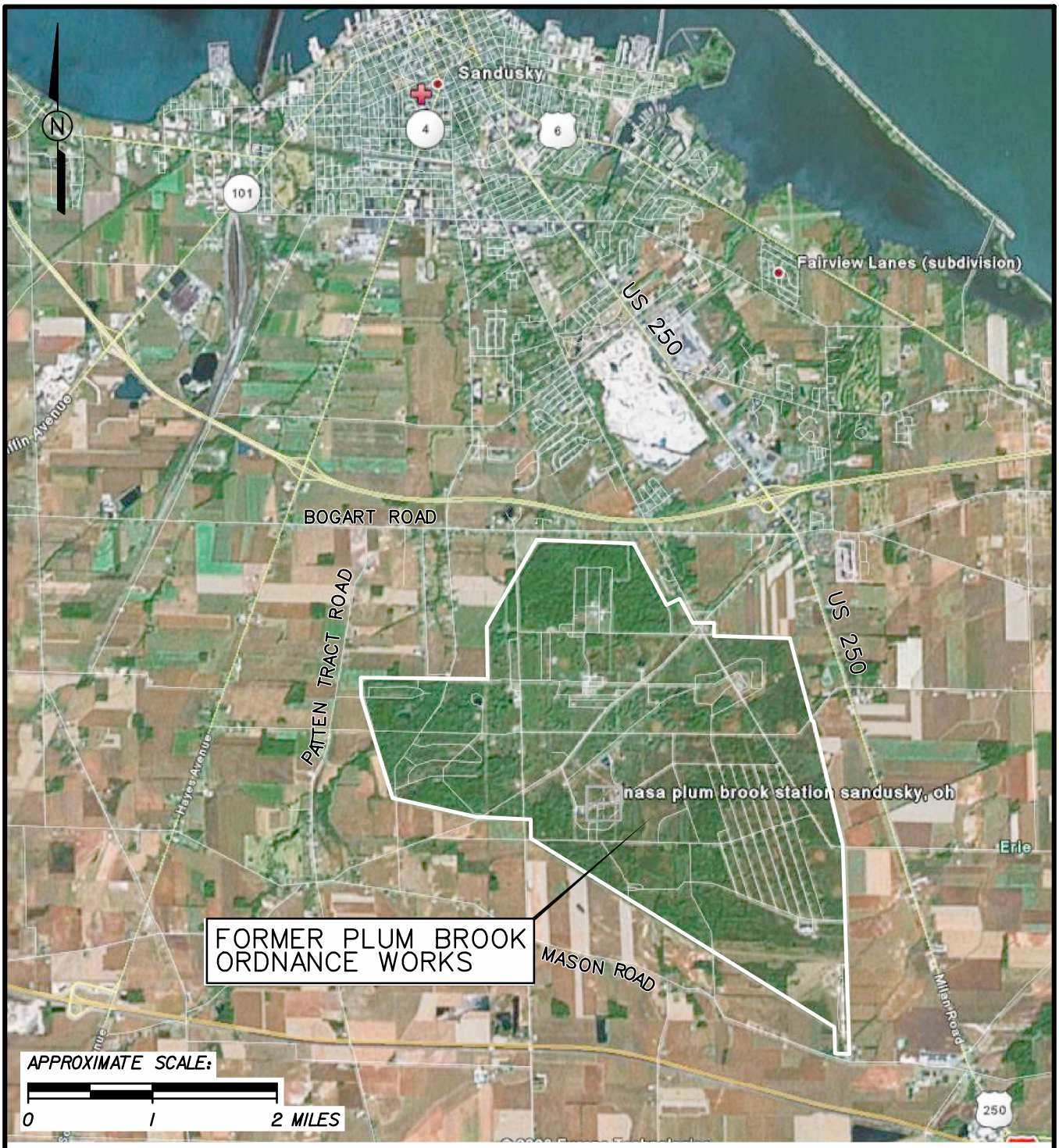
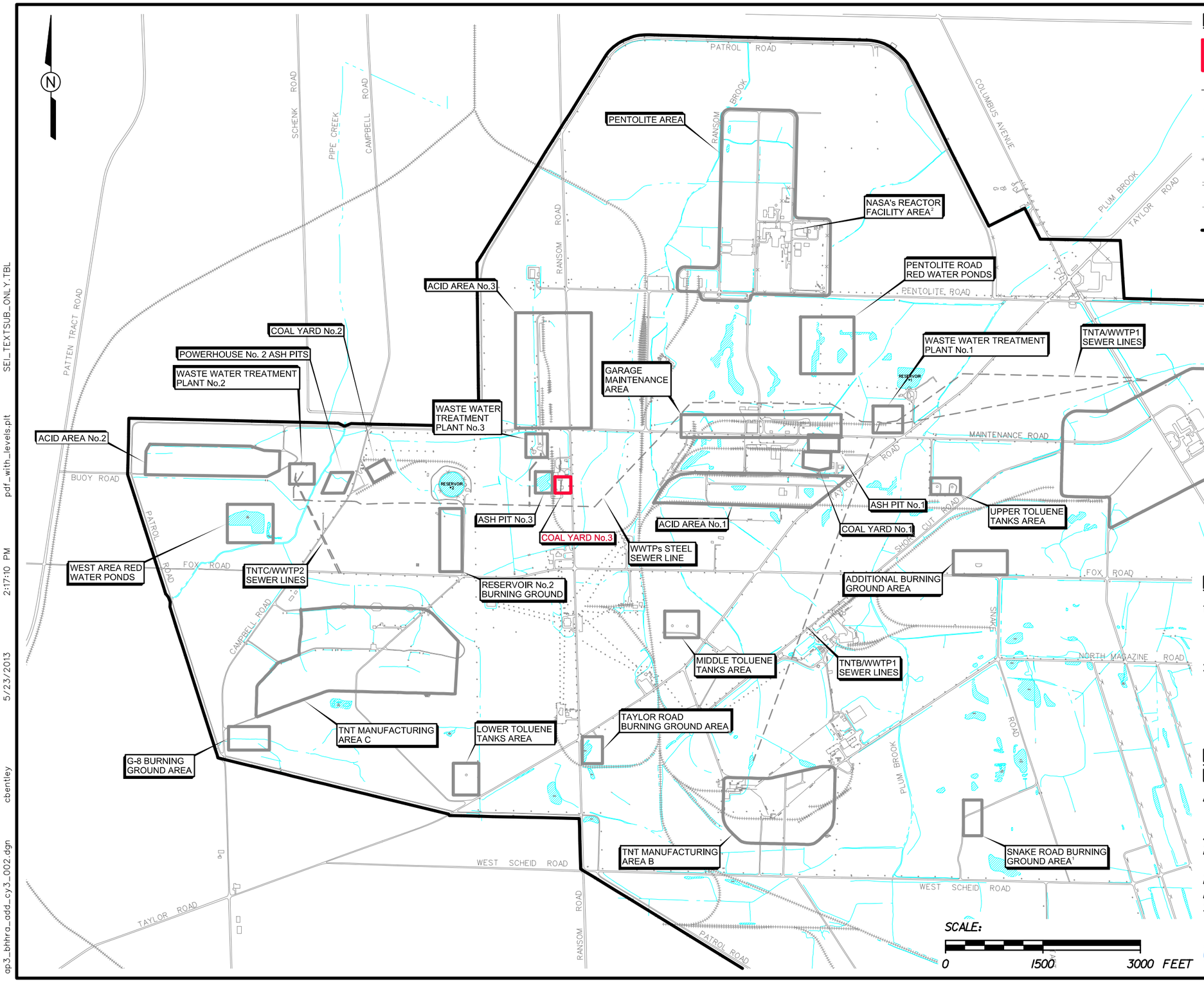


FIGURE 1-1
PBOW VICINITY MAP

ASH PIT No. 3 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

$$$$FILE$$$$ $$$$USER$$$$ $$$$DATE$$$$ $$$$TIME$$$$ $$$$PLTDRVS$$$$ $$$$PENTBLS$$$$



LEGEND:

- AREA OF CONCERN
- APPROXIMATE LOCATION OF SEWER LINES
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. FORMER REACTOR FACILITY WAS CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY. NOTE THAT DEMOLITION OF THE REACTOR FACILITY WAS COMPLETED IN 2012.

FIGURE 1-2
LOCATION OF COAL YARD No. 3 AT PBOW

ASH PIT No. 3 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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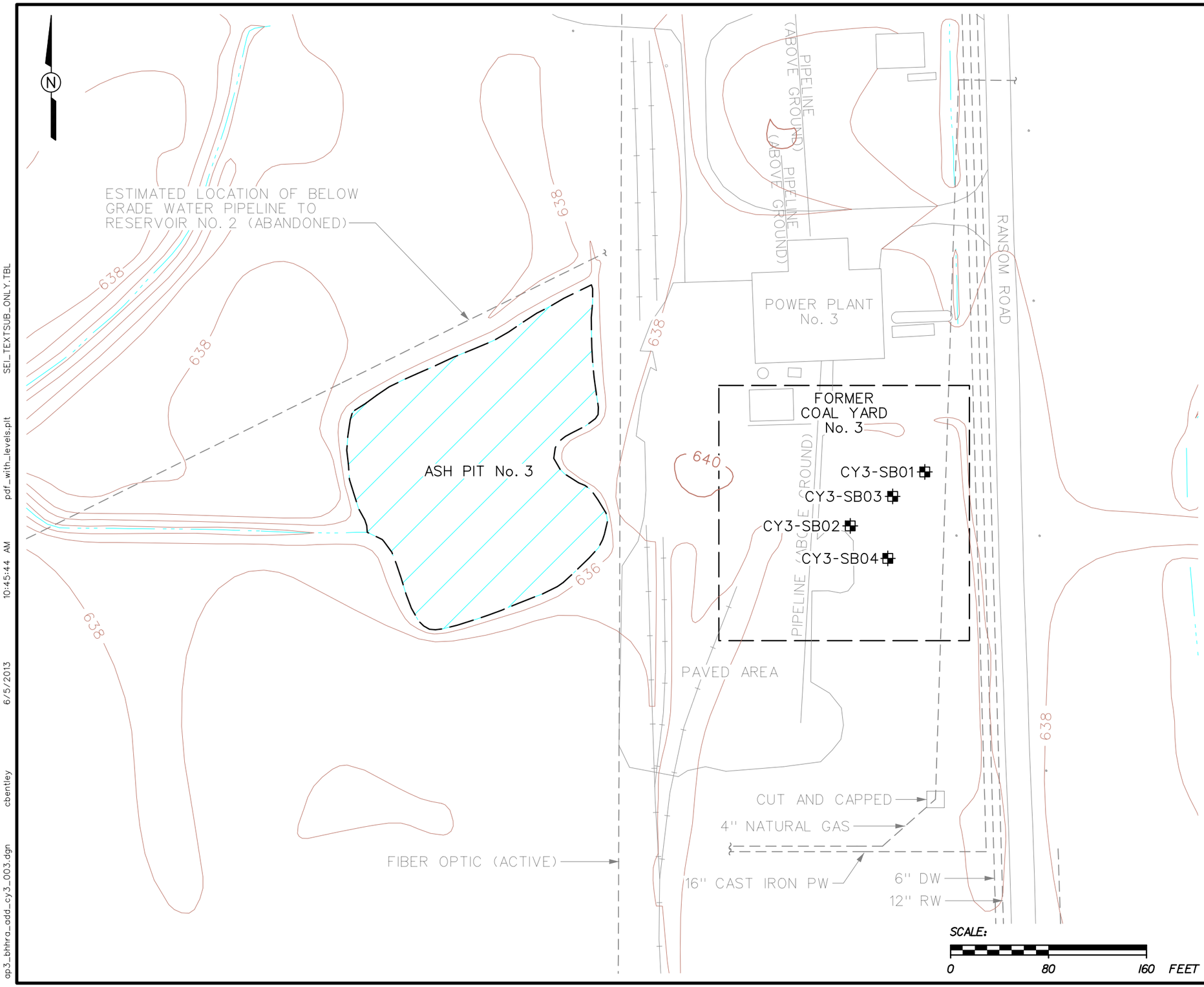

LEGEND:

- SOIL BORING
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- 640 TOPOGRAPHIC CONTOUR (10 FT. INTERVAL)
- 638 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)

NOTE:

FORMER COAL YARD NO. 3 PERIMETER IS BASED ON HISTORICAL AERIAL PHOTOGRAPHY AND IS APPROXIMATE.

FIGURE 2-1
SAMPLE LOCATIONS AT COAL YARD No. 3

ASH PIT No. 3 BASELINE HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3
FORMER PLUM BROOK ORDNANCE WORKS
NASA PLUM BROOK STATION
SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
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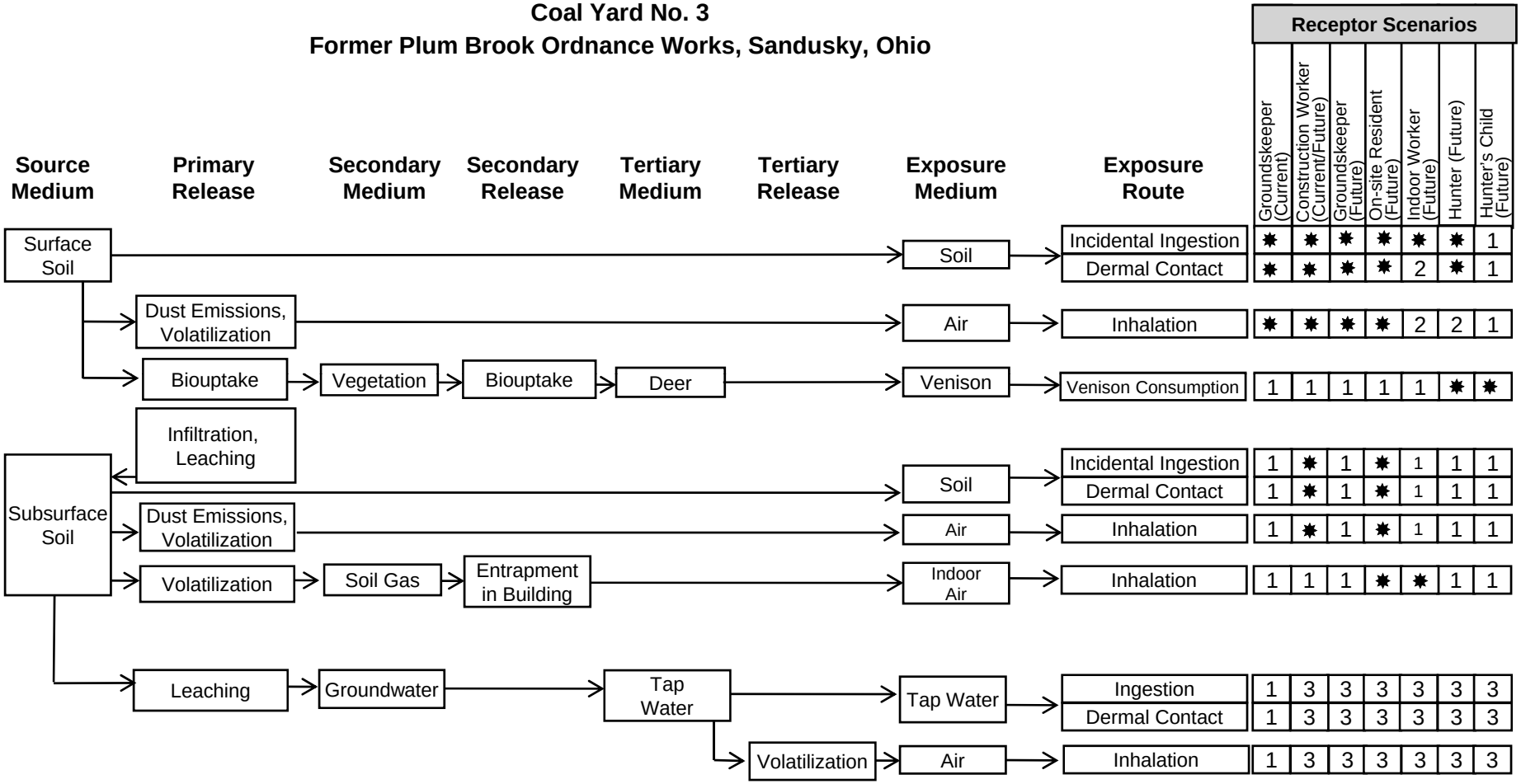
Figure 3-1
Human Health Conceptual Site Exposure Model
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio



✸= Complete exposure route quantified in the risk assessment.
1 = There is no plausible pathway for exposure to this medium.
2 = Although theoretically complete, this pathway is not quantified as explained in text.
3 = Groundwater in the vicinity was evaluated in the Ash Pit No. 3 BHHRA.

APPENDIX A

DATA USED IN THE BASELINE HUMAN HEALTH RISK ASSESSMENT

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB02					CY3-SB03					CY3-SB04				
SAMPLE_NO		CY0031					CY0036					CY0039					CY0042				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG					REG					REG				
DEPTH		_2 - 1_2 Ft					1_5 - 2_5 Ft					0 - 1 Ft					0 - 1 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Dinitrobenzene, 1,3-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Dinitrotoluene, 2,4-	mg/kg	0.14	U	U	0.14	0.068	0.15	U	U	0.15	0.075	0.18	U	U	0.18	0.087	0.15	U	U	0.15	0.075
Dinitrotoluene, 2,6-	mg/kg	0.14	U	U	0.14	0.061	0.15	U	U	0.15	0.067	0.18	U	U	0.18	0.078	0.15	U	U	0.15	0.067
HMX	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Nitrobenzene	mg/kg	0.14	U	U	0.14	0.065	0.15	U	U	0.15	0.072	0.18	U	U	0.18	0.084	0.15	U	U	0.15	0.072
Nitrotoluene, 2-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Nitrotoluene, 3-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Nitrotoluene, 4-	mg/kg	0.14	U	U	0.14	0.071	0.15	U	U	0.15	0.078	0.18	U	U	0.18	0.091	0.15	U	U	0.15	0.078
RDX	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Tetryl	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Trinitrobenzene, 1,3,5-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
Trinitrotoluene, 2,4,6-	mg/kg	0.14	U	U	0.14	0.056	0.15	U	U	0.15	0.062	0.18	U	U	0.18	0.072	0.15	U	U	0.15	0.062
% Solids	Percent	85.1			0		83			0		84.8			0		85.4			0	
Total organic carbon																					
Aluminum	mg/kg	7110			18	1.8	4130			7.9	0.79	5780			9.6	0.96	4640			7.3	0.73
Antimony	mg/kg	1.8	U	U	1.8	0.088	3.9	U	U	3.9	0.2	1.9	U	U	1.9	0.096	1.5	U	U	1.5	0.073
Arsenic	mg/kg	8.8			0.88	0.088	3.6			0.39	0.039	7.2			0.48	0.048	4.9			0.37	0.037
Barium	mg/kg	44.7			18	0.088	19.3			7.9	0.039	37.4			9.6	0.048	42.4			7.3	0.037
Beryllium	mg/kg	0.42	B	J	0.44	0.0088	0.19	B	J	0.2	0.0039	0.3			0.24	0.0048	0.25			0.18	0.0037
Cadmium	mg/kg	0.16	B	J	0.35	0.0088	0.79	U	U	0.79	0.02	0.18	B	J	0.38	0.0096	0.14	B	J	0.29	0.0073
Calcium	mg/kg	20200			440	4.4	68000			980	9.8	38500			480	4.8	31800			370	3.7
Chromium	mg/kg	9.6			0.88	0.088	6.7			2	0.2	10.3			0.96	0.096	8.6			0.73	0.073
Cobalt	mg/kg	8.1			4.4	0.088	2.7			2	0.039	6.7			2.4	0.048	4.7			1.8	0.037
Copper	mg/kg	15.2			2.2	0.088	7.4			0.98	0.039	14.7			1.2	0.048	12			0.91	0.037
Iron	mg/kg	14500			27	3	6480			12	1.3	12100			14	1.6	8830			11	1.2
Lead	mg/kg	11			0.88	0.044	5.8			3.9	0.2	10			1.9	0.096	9.9			1.5	0.073
Magnesium	mg/kg	5920			440	4.4	5020			200	2	10900			240	2.4	9390			180	1.8
Manganese	mg/kg	316			1.3	0.088	240			0.59	0.039	325			0.72	0.048	236			0.55	0.037
Mercury	mg/kg	0.029	B	J	0.093	0.0066	0.03	B	J	0.1	0.0071	0.018	B	J	0.095	0.0068	0.02	B	J	0.091	0.0065
Nickel	mg/kg	19.8			3.5	0.088	5.8			1.6	0.039	17.5			1.9	0.048	12			1.5	0.037
Potassium	mg/kg	755	B	J	880	4.4	273	B	J	390	2	921			480	2.4	558			370	1.8
Selenium	mg/kg	1.8	U	U	1.8	0.18	3.9	U	U	3.9	0.39	1.9	U	U	1.9	0.19	1.5	U	U	1.5	0.15
Silver	mg/kg	0.88	U	U	0.88	0.088	0.39	U	U	0.39	0.039	0.48	U	U	0.48	0.048	0.37	U	U	0.37	0.037
Sodium	mg/kg	880	U	U	880	66	57	B	J	390	30	92.1	B	J	480	36	70	B	J	370	27
Thallium	mg/kg	0.44	U	U	0.44	0.044	2	U	U	2	0.2	0.96	U	U	0.96	0.096	0.73	U	U	0.73	0.073
Vanadium	mg/kg	16.2			4.4	0.088	10.7			2	0.039	13.5			2.4	0.048	10.6			1.8	0.037
Zinc	mg/kg	48.9			1.8	0.088	14.6			3.9	0.2	38.7			1.9	0.096	33.3			1.5	0.073
Aroclor 1016	mg/kg	0.02	U	U	0.02	0.0078	0.02	U	U	0.02	0.0079	0.019	U	U	0.019	0.0077	0.019	U	U	0.019	0.0077
Aroclor 1221	mg/kg	0.02	U	U	0.02	0.0098	0.02	U	U	0.02	0.0099	0.019	U	U	0.019	0.0097	0.019	U	U	0.019	0.0096
Aroclor 1232	mg/kg	0.02	U	U	0.02	0.0098	0.02	U	U	0.02	0.0099	0.019	U	U	0.019	0.0097	0.019	U	U	0.019	0.0096
Aroclor 1242	mg/kg	0.02	U	U	0.02	0.0078	0.02	U	U	0.02	0.0079	0.019	U	U	0.019	0.0077	0.019	U	U	0.019	0.0077
Aroclor 1248	mg/kg	0.02	U	U	0.02	0.0078	0.02	U	U	0.02	0.0079	0.019	U	U	0.019	0.0077	0.019	U	U	0.019	0.0077
Aroclor 1254	mg/kg	0.02	U	U	0.02	0.0078	0.02	U	U	0.02	0.0079	0.019	U	U	0.019	0.0077	0.019	U	U	0.019	0.0077
Aroclor 1260	mg/kg	0.02	U	U	0.02	0.0078	0.02	U	U	0.02	0.0079	0.019	U	U	0.019	0.0077	0.019	U	U	0.019	0.0077
3-Methylphenol and 4-Methylphenol	mg/kg	0.19	U	U	0.19	0.028	0.2	U	U	0.2	0.029	0.2	U	U	0.2	0.028	0.2	U	U	0.2	0.028
Acenaphthene	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Acenaphthylene	mg/kg	0.0657	J	J	0.19	0.019	0.0619	J	J	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Anthracene	mg/kg	0.171	J	J	0.19	0.019	0.0738	J	J	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Benzo(a)anthracene	mg/kg	0.407			0.19	0.019	0.348			0.2	0.02	0.0366	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Benzo(a)pyrene	mg/kg	0.326			0.19	0.019	0.403			0.2	0.02	0.032	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Benzo(b)fluoranthene	mg/kg	0.414			0.19	0.019	0.582			0.2	0.02	0.0291	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Benzo(ghi)perylene	mg/kg	0.203			0.19	0.019	0.277			0.2	0.02	0.0224	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Benzo(k)fluoranthene	mg/kg	0.163	J	J	0.19	0.019	0.188	J	J	0.2	0.02	0.0269	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Benzoic acid	mg/kg	0.97	U	U	0.97	0.34	1	U	U	1	0.35	0.98	U	U	0.98	0.34	0.98	U	U	0.98	0.34
Benzyl alcohol	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Bis(2-chloroethoxy)methane	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Bis(2-chloroethyl)ether	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Bis(2-chloroisopropyl)ether	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Bis(2-ethylhexyl)phthalate	mg/kg	0.39	U	U	0.39	0.078	0.4	U	U	0.4	0.08	0.39	U	U	0.39	0.078	0.39	U	U	0.39	0.078
Bromophenyl phenyl ether, 4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02

Table A-1

Surface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB02					CY3-SB03					CY3-SB04				
SAMPLE_NO		CY0031					CY0036					CY0039					CY0042				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG					REG					REG				
DEPTH		_2 - 1_2 Ft					1_5 - 2_5 Ft					0 - 1 Ft					0 - 1 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Butyl benzyl phthalate	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Carbazole	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Chloro-3-methylphenol, 4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Chloroaniline, 4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Chloronaphthalene, 2-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Chlorophenol, 2-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Chlorophenyl phenyl ether, 4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Chrysene	mg/kg	0.387			0.19	0.019	0.443			0.2	0.02	0.0406	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Dibenz(a,h)anthracene	mg/kg	0.0416	J	J	0.19	0.019	0.0589	J	J	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Dibenzofuran	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Dichlorobenzene, 1,2-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Dichlorobenzene, 1,3-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Dichlorobenzene, 1,4-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Dichlorobenzidine, 3,3'-	mg/kg	0.39	U	U	0.39	0.039	0.4	U	U	0.4	0.04	0.39	U	U	0.39	0.039	0.39	U	U	0.39	0.039
Dichlorophenol, 2,4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Diethyl phthalate	mg/kg	0.39	U	U	0.39	0.078	0.4	U	U	0.4	0.08	0.39	U	U	0.39	0.078	0.39	U	U	0.39	0.078
Dimethyl phthalate	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Dimethylphenol, 2,4-	mg/kg	0.19	U	U	0.19	0.025	0.2	U	U	0.2	0.025	0.2	U	U	0.2	0.025	0.2	U	U	0.2	0.025
Di-n-butyl phthalate	mg/kg	0.39	U	U	0.39	0.078	0.4	U	U	0.4	0.08	0.39	U	U	0.39	0.078	0.39	U	U	0.39	0.078
Dinitro-2-methylphenol, 4,6-	mg/kg	0.39	U	U	0.39	0.078	0.4	U	U	0.4	0.08	0.39	U	U	0.39	0.078	0.39	U	U	0.39	0.078
Dinitrophenol, 2,4-	mg/kg	0.97	U	U	0.97	0.39	1	U	U	1	0.4	0.98	U	U	0.98	0.39	0.98	U	U	0.98	0.39
Dinitrotoluene, 2,4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Dinitrotoluene, 2,6-	mg/kg	0.19	U	U	0.19	0.023	0.2	U	U	0.2	0.024	0.2	U	U	0.2	0.023	0.2	U	U	0.2	0.023
Di-n-octyl phthalate	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Fluoranthene	mg/kg	0.843			0.19	0.019	0.662			0.2	0.02	0.0525	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Fluorene	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Hexachlorobenzene	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Hexachlorobutadiene	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Hexachlorocyclopentadiene	mg/kg	0.19	U	U	0.19	0.086	0.2	U	U	0.2	0.088	0.2	U	U	0.2	0.086	0.2	U	U	0.2	0.086
Hexachloroethane	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Indeno(1,2,3-cd)pyrene	mg/kg	0.223			0.19	0.019	0.294			0.2	0.02	0.0255	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Isophorone	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Methylnaphthalene, 2-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.021	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Methylphenol, 2-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Naphthalene	mg/kg	0.19	U	U	0.19	0.031	0.2	U	U	0.2	0.032	0.2	U	U	0.2	0.031	0.2	U	U	0.2	0.031
Nitroaniline, 2-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Nitroaniline, 3-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Nitroaniline, 4-	mg/kg	0.19	U	U	0.19	0.039	0.2	U	U	0.2	0.04	0.2	U	U	0.2	0.039	0.2	U	U	0.2	0.039
Nitrobenzene	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Nitrophenol, 2-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Nitrophenol, 4-	mg/kg	0.97	U	U	0.97	0.16	1	U	U	1	0.16	0.98	U	U	0.98	0.16	0.98	U	U	0.98	0.16
n-Nitroso-di-n-propylamine	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
n-Nitrosodiphenylamine	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Pentachlorophenol	mg/kg	0.97	U	U	0.97	0.23	1	U	U	1	0.24	0.98	U	U	0.98	0.23	0.98	U	U	0.98	0.23
Phenanthrene	mg/kg	0.415			0.19	0.019	0.249			0.2	0.02	0.0278	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Phenol	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Pyrene	mg/kg	0.636			0.19	0.019	0.508			0.2	0.02	0.0438	J	J	0.2	0.02	0.2	U	U	0.2	0.02
Trichlorobenzene, 1,2,4-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Trichlorophenol, 2,4,5-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02
Trichlorophenol, 2,4,6-	mg/kg	0.19	U	U	0.19	0.019	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02	0.2	U	U	0.2	0.02

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligram(s) per kologram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB01					CY3-SB01					CY3-SB01				
SAMPLE_NO		CY0032					CY0033					CY0034					CY0035				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					FD					FS					REG				
DEPTH		3 - 5 Ft					3 - 5 Ft					3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.02	0.16	U	U	0.16	0.066
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.098	0.16	U	U	0.16	0.066
Dinitrobenzene, 1,3-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.049	0.16	U	U	0.16	0.066
Dinitrotoluene, 2,4-	mg/kg	0.18	U	U	0.18	0.086	0.16	U	U	0.16	0.08	0.24	U	U	0.24	0.02	0.16	U	U	0.16	0.08
Dinitrotoluene, 2,6-	mg/kg	0.18	U	U	0.18	0.077	0.16	U	U	0.16	0.072	0.24	U	U	0.24	0.029	0.16	U	U	0.16	0.071
HMX	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.029	0.16	U	U	0.16	0.066
Nitrobenzene	mg/kg	0.18	U	U	0.18	0.082	0.16	U	U	0.16	0.077	0.24	U	U	0.24	0.049	0.16	U	U	0.16	0.076
Nitrotoluene, 2-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.078	0.16	U	U	0.16	0.066
Nitrotoluene, 3-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.069	0.16	U	U	0.16	0.066
Nitrotoluene, 4-	mg/kg	0.18	U	U	0.18	0.089	0.16	U	U	0.16	0.083	0.24	U	U	0.24	0.078	0.16	U	U	0.16	0.083
RDX	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.039	0.16	U	U	0.16	0.066
Tetryl	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.049	0.16	U	U	0.16	0.066
Trinitrobenzene, 1,3,5-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.02	0.16	U	U	0.16	0.066
Trinitrotoluene, 2,4,6-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.066	0.24	U	U	0.24	0.02	0.16	U	U	0.16	0.066
% Solids	Percent	81			0		80.1			0							80.5			0	
Aluminum	mg/kg	11400			48	4.8	11400			62	6.2	8700			34	7.9	6040			9.3	0.93
Antimony	mg/kg	4.8	U	U	4.8	0.24	6.2	U	U	6.2	0.31	3.4	U	UJ	3.4	0.87	1.9	U	U	1.9	0.093
Arsenic	mg/kg	8.7			2.4	0.24	12.9			3.1	0.31	4.2			2.2	0.42	8.6			0.46	0.046
Barium	mg/kg	64.3			48	0.24	70.7			62	0.31	61			22	0.43	53.2			9.3	0.046
Beryllium	mg/kg	0.7	B	J	1.2	0.024	0.61	B	J	1.6	0.031	0.18	J	J	0.56	0.057	0.3			0.23	0.0046
Cadmium	mg/kg	0.96	U	U	0.96	0.024	1.2	U	U	1.2	0.031	0.054	J	J	0.56	0.033	0.11	B	J	0.37	0.0093
Calcium	mg/kg	2740			1200	12	3260			1600	16	2700		J	560	55	40300			460	4.6
Chromium	mg/kg	15.6			2.4	0.24	17.2			3.1	0.31	12		J	1.1	0.25	10.7			0.93	0.093
Cobalt	mg/kg	8.6	B	J	12	0.24	8.4	B	J	16	0.31	6			1.1	0.12	5.5			2.3	0.046
Copper	mg/kg	13.2			6	0.24	19.5			7.8	0.31	9.2		J	2.8	0.51	14.3			1.2	0.046
Iron	mg/kg	18700			72	8.1	25800			94	11	14000			56	12	11600			14	1.6
Lead	mg/kg	8.6			0.96	0.048	9.7			1.2	0.062	5.7			1.1	0.26	9.7			1.9	0.093
Magnesium	mg/kg	2250			1200	12	1970			1600	16	2000	B		560	11	12000			230	2.3
Manganese	mg/kg	426			3.6	0.24	291			4.7	0.31	230		J	1.7	0.31	274			0.7	0.046
Mercury	mg/kg	0.021	B	J	0.1	0.0073	0.049	B	J	0.1	0.0071	0.022	J	J	0.11	0.016	0.013	B	J	0.1	0.0073
Nickel	mg/kg	19.6			9.6	0.24	23.9			12	0.31	13			4.5	0.37	14.8			1.9	0.046
Potassium	mg/kg	697	B	J	2400	12	598	B	J	3100	16	550	J	J	560	30	982			460	2.3
Selenium	mg/kg	4.8	U	U	4.8	0.48	6.2	U	U	6.2	0.62	2.2	U	U	2.2	0.54	1.9	U	U	1.9	0.19
Silver	mg/kg	2.4	U	U	2.4	0.24	3.1	U	U	3.1	0.31	0.56	U	U	0.56	0.17	0.46	U	U	0.46	0.046
Sodium	mg/kg	2400	U	U	2400	180	3100	U	U	3100	230	560	U	U	560	95	91.5	B	J	460	35
Thallium	mg/kg	0.48	U	U	0.48	0.048	0.62	U	U	0.62	0.062	1	J	J	3.4	0.85	0.93	U	U	0.93	0.093
Vanadium	mg/kg	27.3			12	0.24	33.4			16	0.31	19			1.1	0.13	12.2			2.3	0.046
Zinc	mg/kg	38.5			4.8	0.24	50.4			6.2	0.31	30		J	5.6	1.7	38.3			1.9	0.093
Aroclor 1016	mg/kg	0.02	U	U	0.02	0.0081	0.02	U	U	0.02	0.0082	0.08	U	U	0.08	0.026					
Aroclor 1221	mg/kg	0.02	U	U	0.02	0.01	0.02	U	U	0.02	0.01	0.061	U	U	0.061	0.02					
Aroclor 1232	mg/kg	0.02	U	U	0.02	0.01	0.02	U	U	0.02	0.01	0.055	U	U	0.055	0.017					
Aroclor 1242	mg/kg	0.02	U	U	0.02	0.0081	0.02	U	U	0.02	0.0082	0.049	U	U	0.049	0.016					
Aroclor 1248	mg/kg	0.02	U	U	0.02	0.0081	0.02	U	U	0.02	0.0082	0.067	U	U	0.067	0.021					
Aroclor 1254	mg/kg	0.02	U	U	0.02	0.0081	0.02	U	U	0.02	0.0082	0.067	U	U	0.067	0.021					
Aroclor 1260	mg/kg	0.02	U	U	0.02	0.0081	0.02	U	U	0.02	0.0082	0.067	U	U	0.067	0.021					
3-Methylphenol and 4-Methylphenol	mg/kg	0.21	U	U	0.21	0.03	0.21	U	U	0.21	0.03	0.49	U	U	0.49	0.024	0.2	U	U	0.2	0.029
Acenaphthene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Acenaphthylene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Acetophenone	mg/kg											0.12	U	U	0.12	0.011					
Anthracene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Atrazine	mg/kg											0.24	U	U	0.24	0.011					
Benzaldehyde	mg/kg											0.12	U	U	0.12	0.015					
Benzo(a)anthracene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Benzo(a)pyrene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Benzo(b)fluoranthene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Benzo(ghi)perylene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Benzo(k)fluoranthene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Benzoic acid	mg/kg	1	U	U	1	0.36	1	U	U	1	0.36						1	U	U	1	0.36
Benzyl alcohol	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041						0.2	U	U	0.2	0.041
Bibenzene	mg/kg											0.061	U	U	0.061	0.033					
Bis(2-chloroethoxy)methane	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.12	U	U	0.12	0.027	0.2	U	U	0.2	0.02
Bis(2-chloroethyl)ether	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.12	U	U	0.12	0.0024	0.2	U	U	0.2	0.02
Bis(2-chloroisopropyl)ether	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.12	U	U	0.12	0.012	0.2	U	U	0.2	0.02
Bis(2-ethylhexyl)phthalate	mg/kg	0.41	U	U	0.41	0.083	0.41	U	U	0.41	0.082	0.061	U	U	0.061	0.023	0.41	U	U	0.41	0.081
Bromophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.016	0.2	U	U	0.2	0.02
Butyl benzyl phthalate	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.012	0.2	U	U	0.2	0.041
Caprolactam	mg/kg											0.4	U	U	0.4	0.045					

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB01					CY3-SB01					CY3-SB01				
SAMPLE_NO		CY0032					CY0033					CY0034					CY0035				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					FD					FS					REG				
DEPTH		3 - 5 Ft					3 - 5 Ft					3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Carbazole	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.02
Chloro-3-methylphenol, 4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.18	U	U	0.18	0.026	0.2	U	U	0.2	0.02
Chloroaniline, 4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.18	U	U	0.18	0.021	0.2	U	U	0.2	0.02
Chloronaphthalene, 2-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.004	0.2	U	U	0.2	0.041
Chlorophenol, 2-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.02
Chlorophenyl phenyl ether, 4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.016	0.2	U	U	0.2	0.02
Chrysene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.0013	0.2	U	U	0.2	0.02
Dibenz(a,h)anthracene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Dibenzofuran	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.004	0.2	U	U	0.2	0.02
Dichlorobenzene, 1,2-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041						0.2	U	U	0.2	0.041
Dichlorobenzene, 1,3-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041						0.2	U	U	0.2	0.041
Dichlorobenzene, 1,4-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041						0.2	U	U	0.2	0.041
Dichlorobenzidine, 3,3'-	mg/kg	0.41	U	U	0.41	0.041	0.41	U	U	0.41	0.041	0.12	U	U	0.12	0.022	0.41	U	U	0.41	0.041
Dichlorophenol, 2,4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.18	U	U	0.18	0.024	0.2	U	U	0.2	0.02
Diethyl phthalate	mg/kg	0.41	U	U	0.41	0.083	0.41	U	U	0.41	0.082	0.061	U	U	0.061	0.019	0.41	U	U	0.41	0.081
Dimethyl phthalate	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.021	0.2	U	U	0.2	0.041
Dimethylphenol, 2,4-	mg/kg	0.21	U	U	0.21	0.026	0.21	U	U	0.21	0.026	0.18	U	U	0.18	0.024	0.2	U	U	0.2	0.026
Di-n-butyl phthalate	mg/kg	0.41	U	U	0.41	0.083	0.41	U	U	0.41	0.082	0.061	U	U	0.061	0.018	0.41	U	U	0.41	0.081
Dinitro-2-methylphenol, 4,6-	mg/kg	0.41	U	U	0.41	0.083	0.41	U	U	0.41	0.082	0.18	U	U	0.18	0.097	0.41	U	U	0.41	0.081
Dinitrophenol, 2,4-	mg/kg	1	U	U	1	0.41	1	U	U	1	0.41	0.4	U	U	0.4	0.097	1	U	U	1	0.41
Dinitrotoluene, 2,4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.24	U	U	0.24	0.033	0.2	U	U	0.2	0.02
Dinitrotoluene, 2,6-	mg/kg	0.21	U	U	0.21	0.024	0.21	U	U	0.21	0.024	0.24	U	U	0.24	0.026	0.2	U	U	0.2	0.024
Di-n-octyl phthalate	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.041
Fluoranthene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Fluorene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Hexachlorobenzene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.0026	0.2	U	U	0.2	0.02
Hexachlorobutadiene	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.041
Hexachlorocyclopentadiene	mg/kg	0.21	U	U	0.21	0.091	0.21	U	U	0.21	0.091	0.4	U	U	0.4	0.033	0.2	U	U	0.2	0.09
Hexachloroethane	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.061	U	U	0.061	0.011	0.2	U	U	0.2	0.041
Indeno(1,2,3-cd)pyrene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Isophorone	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.016	0.2	U	U	0.2	0.02
Methylnaphthalene, 2-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.01			0.0081	0.004	0.2	U	U	0.2	0.02
Methylphenol, 2-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.24	U	U	0.24	0.097	0.2	U	U	0.2	0.02
Naphthalene	mg/kg	0.21	U	U	0.21	0.033	0.21	U	U	0.21	0.033	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.033
Nitroaniline, 2-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.24	U	U	0.24	0.011	0.2	U	U	0.2	0.041
Nitroaniline, 3-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.24	U	U	0.24	0.019	0.2	U	U	0.2	0.041
Nitroaniline, 4-	mg/kg	0.21	U	U	0.21	0.041	0.21	U	U	0.21	0.041	0.24	U	U	0.24	0.032	0.2	U	U	0.2	0.041
Nitrobenzene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.12	U	U	0.12	0.0027	0.2	U	U	0.2	0.02
Nitrophenol, 2-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.02
Nitrophenol, 4-	mg/kg	1	U	U	1	0.17	1	U	U	1	0.16	0.4	U	U	0.4	0.097	1	U	U	1	0.16
n-Nitroso-di-n-propylamine	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.02
n-Nitrosodiphenylamine	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.026	0.2	U	U	0.2	0.02
Pentachlorophenol	mg/kg	1	U	U	1	0.25	1	U	U	1	0.25	0.18	U	U	0.18	0.097	1	U	U	1	0.24
Phenanthrene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Phenol	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.061	U	U	0.061	0.033	0.2	U	U	0.2	0.02
Pyrene	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.0081	U	U	0.0081	0.004	0.2	U	U	0.2	0.02
Trichlorobenzene, 1,2,4-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021						0.2	U	U	0.2	0.02
Trichlorophenol, 2,4,5-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.18	U	U	0.18	0.03	0.2	U	U	0.2	0.02
Trichlorophenol, 2,4,6-	mg/kg	0.21	U	U	0.21	0.021	0.21	U	U	0.21	0.021	0.18	U	U	0.18	0.097	0.2	U	U	0.2	0.02

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB02					CY3-SB02					CY3-SB03					CY3-SB03				
SAMPLE_NO		CY0037					CY0038					CY0040					CY0041				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG					REG					REG				
DEPTH		3 - 5 Ft					8 - 10 Ft					3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Dinitrobenzene, 1,3-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Dinitrotoluene, 2,4-	mg/kg	0.18	U	U	0.18	0.086	0.16	U	U	0.16	0.076	0.17	U	U	0.17	0.083	0.14	U	U	0.14	0.07
Dinitrotoluene, 2,6-	mg/kg	0.18	U	U	0.18	0.077	0.16	U	U	0.16	0.069	0.17	U	U	0.17	0.075	0.14	U	U	0.14	0.063
HMX	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Nitrobenzene	mg/kg	0.18	U	U	0.18	0.082	0.16	U	U	0.16	0.073	0.17	U	U	0.17	0.08	0.14	U	U	0.14	0.067
Nitrotoluene, 2-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Nitrotoluene, 3-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Nitrotoluene, 4-	mg/kg	0.18	U	U	0.18	0.089	0.16	U	U	0.16	0.08	0.17	U	U	0.17	0.087	0.14	U	U	0.14	0.073
RDX	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Tetryl	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Trinitrobenzene, 1,3,5-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
Trinitrotoluene, 2,4,6-	mg/kg	0.18	U	U	0.18	0.071	0.16	U	U	0.16	0.063	0.17	U	U	0.17	0.069	0.14	U	U	0.14	0.058
% Solids	Percent	81.7			0		77.1			0		83.2			0		79.4			0	
Aluminum	mg/kg	8230			19	1.9	6530			10	1	7270		J	11	1.1	7100			11	1.1
Antimony	mg/kg	1.9	U	U	1.9	0.094	0.15	B	J	1	0.05	1.1	U	UJ	1.1	0.056	0.29	B	J	1.1	0.054
Arsenic	mg/kg	7.5			0.94	0.094	5.6			0.5	0.05	3.7		J	0.56	0.056	4.8			0.54	0.054
Barium	mg/kg	58.2			19	0.094	50.2			10	0.05	51		J	11	0.056	46.1			11	0.054
Beryllium	mg/kg	0.49			0.47	0.0094	0.38			0.25	0.005	0.38		J	0.28	0.0056	0.37			0.27	0.0054
Cadmium	mg/kg	0.38	U	U	0.38	0.0094	0.42			0.2	0.005	0.26		J	0.22	0.0056	0.61			0.22	0.0054
Calcium	mg/kg	2340			470	4.7	14000			250	2.5	2850		J	280	2.8	28500			270	2.7
Chromium	mg/kg	12.1			0.94	0.094	9.4			0.5	0.05	9.1		J	0.56	0.056	10.4			0.54	0.054
Cobalt	mg/kg	5.9			4.7	0.094	6.1			2.5	0.05	3.6		J	2.8	0.056	6.2			2.7	0.054
Copper	mg/kg	12.2			2.4	0.094	13			1.2	0.05	10.5		J	1.4	0.056	16.1			1.4	0.054
Iron	mg/kg	15000			28	3.2	12100			15	1.7	9520		J	17	1.9	13600			16	1.8
Lead	mg/kg	9.3			0.94	0.047	9.7			1	0.05	9.4		J	1.1	0.056	10			1.1	0.054
Magnesium	mg/kg	1600			470	4.7	6010			250	2.5	1450		J	280	2.8	9740			270	2.7
Manganese	mg/kg	251			1.4	0.094	269			0.75	0.05	158		J	0.83	0.056	346			0.81	0.054
Mercury	mg/kg	0.033	B	J	0.1	0.0071	0.022	B	J	0.094	0.0067	0.05	B	J	0.091	0.0065	0.019	B	J	0.1	0.0072
Nickel	mg/kg	15.6			3.8	0.094	14.6			2	0.05	8.8		J	2.2	0.056	17.3			2.2	0.054
Potassium	mg/kg	478	B	J	940	4.7	465	B	J	500	2.5	387	B	J	560	2.8	929			540	2.7
Selenium	mg/kg	1.9	U	U	1.9	0.19	1	U	U	1	0.1	1.1	U	UJ	1.1	0.11	1.1	U	U	1.1	0.11
Silver	mg/kg	0.94	U	U	0.94	0.094	0.5	U	U	0.5	0.05	0.56	U	UJ	0.56	0.056	0.54	U	U	0.54	0.054
Sodium	mg/kg	940	U	U	940	71	55.7	B	J	500	37	560	U	UJ	560	42	76.9	B	J	540	41
Thallium	mg/kg	0.47	U	U	0.47	0.047	0.5	U	U	0.5	0.05	0.56	U	U	0.56	0.056	0.54	U	U	0.54	0.054
Vanadium	mg/kg	23.7			4.7	0.094	16.2			2.5	0.05	16.3		J	2.8	0.056	15.6			2.7	0.054
Zinc	mg/kg	30.9			1.9	0.094	29			1	0.05	25.9		J	1.1	0.056	38			1.1	0.054
Aroclor 1016	mg/kg	0.02	U	U	0.02	0.0081						0.02	U	U	0.02	0.008					
Aroclor 1221	mg/kg	0.02	U	U	0.02	0.01						0.02	U	U	0.02	0.01					
Aroclor 1232	mg/kg	0.02	U	U	0.02	0.01						0.02	U	U	0.02	0.01					
Aroclor 1242	mg/kg	0.02	U	U	0.02	0.0081						0.02	U	U	0.02	0.008					
Aroclor 1248	mg/kg	0.02	U	U	0.02	0.0081						0.02	U	U	0.02	0.008					
Aroclor 1254	mg/kg	0.02	U	U	0.02	0.0081						0.02	U	U	0.02	0.008					
Aroclor 1260	mg/kg	0.02	U	U	0.02	0.0081						0.02	U	U	0.02	0.008					
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	U	U	0.2	0.029	0.22	U	U	0.22	0.032	0.2	U	U	0.2	0.029	0.21	U	U	0.21	0.03
Acenaphthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Acenaphthylene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Acetophenone	mg/kg																				
Anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Atrazine	mg/kg																				
Benzaldehyde	mg/kg																				
Benzo(a)anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Benzo(a)pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Benzo(b)fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Benzo(ghi)perylene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Benzo(k)fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Benzoic acid	mg/kg	1	U	U	1	0.35	1.1	U	U	1.1	0.39	1	U	UJ	1	0.35	1	U	U	1	0.37
Benzyl alcohol	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Bibenzene	mg/kg																				
Bis(2-chloroethoxy)methane	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Bis(2-chloroethyl)ether	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Bis(2-chloroisopropyl)ether	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	U	U	0.4	0.081	0.44	U	U	0.44	0.088	0.4	U	U	0.4	0.08	0.42	U	U	0.42	0.083
Bromophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Butyl benzyl phthalate	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Caprolactam	mg/kg																				

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB02					CY3-SB02					CY3-SB03					CY3-SB03				
SAMPLE_NO		CY0037					CY0038					CY0040					CY0041				
SAMPLE_DATE		19-Dec-11					19-Dec-11					19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG					REG					REG				
DEPTH		3 - 5 Ft					8 - 10 Ft					3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Carbazole	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Chloro-3-methylphenol, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Chloroaniline, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Chloronaphthalene, 2-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Chlorophenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Chrysene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Dibenz(a,h)anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Dibenzofuran	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Dichlorobenzene, 1,2-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Dichlorobenzene, 1,3-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Dichlorobenzene, 1,4-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Dichlorobenzidine, 3,3'-	mg/kg	0.4	U	U	0.4	0.04	0.44	U	U	0.44	0.044	0.4	U	U	0.4	0.04	0.42	U	U	0.42	0.042
Dichlorophenol, 2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Diethyl phthalate	mg/kg	0.4	U	U	0.4	0.081	0.44	U	U	0.44	0.088	0.4	U	U	0.4	0.08	0.42	U	U	0.42	0.083
Dimethyl phthalate	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Dimethylphenol, 2,4-	mg/kg	0.2	U	U	0.2	0.025	0.22	U	U	0.22	0.028	0.2	U	U	0.2	0.025	0.21	U	U	0.21	0.026
Di-n-butyl phthalate	mg/kg	0.4	U	U	0.4	0.081	0.44	U	U	0.44	0.088	0.4	U	U	0.4	0.08	0.42	U	U	0.42	0.083
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	U	U	0.4	0.081	0.44	U	U	0.44	0.088	0.4	U	U	0.4	0.08	0.42	U	U	0.42	0.083
Dinitrophenol, 2,4-	mg/kg	1	U	U	1	0.4	1.1	U	U	1.1	0.44	1	U	U	1	0.4	1	U	U	1	0.42
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.2	0.024	0.22	U	U	0.22	0.026	0.2	U	U	0.2	0.024	0.21	U	U	0.21	0.025
Di-n-octyl phthalate	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Fluorene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Hexachlorobenzene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Hexachlorobutadiene	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Hexachlorocyclopentadiene	mg/kg	0.2	U	U	0.2	0.089	0.22	U	U	0.22	0.096	0.2	U	U	0.2	0.088	0.21	U	U	0.21	0.092
Hexachloroethane	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Isophorone	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	UJ	0.2	0.02	0.21	U	U	0.21	0.021
Methylnaphthalene, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Methylphenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Naphthalene	mg/kg	0.2	U	U	0.2	0.032	0.22	U	U	0.22	0.035	0.2	U	U	0.2	0.032	0.21	U	U	0.21	0.033
Nitroaniline, 2-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Nitroaniline, 3-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Nitroaniline, 4-	mg/kg	0.2	U	U	0.2	0.04	0.22	U	U	0.22	0.044	0.2	U	U	0.2	0.04	0.21	U	U	0.21	0.042
Nitrobenzene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Nitrophenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Nitrophenol, 4-	mg/kg	1	U	U	1	0.16	1.1	U	U	1.1	0.18	1	U	U	1	0.16	1	U	U	1	0.17
n-Nitroso-di-n-propylamine	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
n-Nitrosodiphenylamine	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Pentachlorophenol	mg/kg	1	U	U	1	0.24	1.1	U	U	1.1	0.26	1	U	U	1	0.24	1	U	U	1	0.25
Phenanthrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Phenol	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Trichlorobenzene, 1,2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Trichlorophenol, 2,4,5-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021
Trichlorophenol, 2,4,6-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022	0.2	U	U	0.2	0.02	0.21	U	U	0.21	0.021

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB04					CY3-SB04				
SAMPLE_NO		CY0043					CY0044				
SAMPLE_DATE		19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG				
DEPTH		3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Dinitrobenzene, 1,3-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Dinitrotoluene, 2,4-	mg/kg	0.16	U	U	0.16	0.079	0.16	U	U	0.16	0.078
Dinitrotoluene, 2,6-	mg/kg	0.16	U	U	0.16	0.07	0.16	U	U	0.16	0.07
HMX	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Nitrobenzene	mg/kg	0.16	U	U	0.16	0.075	0.16	U	U	0.16	0.075
Nitrotoluene, 2-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Nitrotoluene, 3-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Nitrotoluene, 4-	mg/kg	0.16	U	U	0.16	0.082	0.16	U	U	0.16	0.081
RDX	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Tetryl	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Trinitrobenzene, 1,3,5-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
Trinitrotoluene, 2,4,6-	mg/kg	0.16	U	U	0.16	0.065	0.16	U	U	0.16	0.065
% Solids	Percent	80.7			0		76.1			0	
Aluminum	mg/kg	8390			24	2.4	7330			11	1.1
Antimony	mg/kg	2.4	U	U	2.4	0.12	2.1	U	U	2.1	0.11
Arsenic	mg/kg	7.8			1.2	0.12	7.3			0.53	0.053
Barium	mg/kg	66.3			24	0.12	59.6			11	0.053
Beryllium	mg/kg	0.49	B	J	0.59	0.012	0.38			0.26	0.0053
Cadmium	mg/kg	0.47	U	U	0.47	0.012	0.21	B	J	0.42	0.011
Calcium	mg/kg	2860			590	5.9	42700			530	5.3
Chromium	mg/kg	12.6			1.2	0.12	14.3			1.1	0.11
Cobalt	mg/kg	6.7			5.9	0.12	9			2.6	0.053
Copper	mg/kg	15.7			3	0.12	18.9			1.3	0.053
Iron	mg/kg	16400			35	4	13900			16	1.8
Lead	mg/kg	9.4			1.2	0.059	12.8			2.1	0.11
Magnesium	mg/kg	1990			590	5.9	12900			260	2.6
Manganese	mg/kg	436			1.8	0.12	400			0.79	0.053
Mercury	mg/kg	0.034	B	J	0.094	0.0067	0.015	B	J	0.11	0.0078
Nickel	mg/kg	18.7			4.7	0.12	21.6			2.1	0.053
Potassium	mg/kg	454	B	J	1200	5.9	1010			530	2.6
Selenium	mg/kg	2.4	U	U	2.4	0.24	2.1	U	U	2.1	0.21
Silver	mg/kg	1.2	U	U	1.2	0.12	0.53	U	U	0.53	0.053
Sodium	mg/kg	1200	U	U	1200	89	89.1	B	J	530	39
Thallium	mg/kg	0.59	U	U	0.59	0.059	1.1	U	U	1.1	0.11
Vanadium	mg/kg	22.4			5.9	0.12	16			2.6	0.053
Zinc	mg/kg	39.3			2.4	0.12	48.5			2.1	0.11
Aroclor 1016	mg/kg	0.021	U	U	0.021	0.0082					
Aroclor 1221	mg/kg	0.021	U	U	0.021	0.01					
Aroclor 1232	mg/kg	0.021	U	U	0.021	0.01					
Aroclor 1242	mg/kg	0.021	U	U	0.021	0.0082					
Aroclor 1248	mg/kg	0.021	U	U	0.021	0.0082					
Aroclor 1254	mg/kg	0.021	U	U	0.021	0.0082					
Aroclor 1260	mg/kg	0.021	U	U	0.021	0.0082					
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	U	U	0.2	0.029	0.22	U	U	0.22	0.032
Acenaphthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Acenaphthylene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Acetophenone	mg/kg										
Anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Atrazine	mg/kg										
Benzaldehyde	mg/kg										
Benzo(a)anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Benzo(a)pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Benzo(b)fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Benzo(ghi)perylene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Benzo(k)fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Benzoic acid	mg/kg	1	U	U	1	0.36	1.1	U	U	1.1	0.39
Benzyl alcohol	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Bibenzene	mg/kg										
Bis(2-chloroethoxy)methane	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Bis(2-chloroethyl)ether	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Bis(2-chloroisopropyl)ether	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Bis(2-ethylhexyl)phthalate	mg/kg	0.41	U	U	0.41	0.082	0.44	U	U	0.44	0.088
Bromophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Butyl benzyl phthalate	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Caprolactam	mg/kg										

Table A-2

Subsurface Soil Data Used in the Baseline Human Health Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB04					CY3-SB04				
SAMPLE_NO		CY0043					CY0044				
SAMPLE_DATE		19-Dec-11					19-Dec-11				
SAMPLE_PURPOSE		REG					REG				
DEPTH		3 - 5 Ft					8 - 10 Ft				
Parameter	Units	Result	Qual	ValQual	RL	MDL	Result	Qual	ValQual	RL	MDL
Carbazole	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Chloro-3-methylphenol, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Chloroaniline, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Chloronaphthalene, 2-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Chlorophenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Chrysene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Dibenz(a,h)anthracene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Dibenzofuran	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Dichlorobenzene, 1,2-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Dichlorobenzene, 1,3-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Dichlorobenzene, 1,4-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Dichlorobenzidine, 3,3'-	mg/kg	0.41	U	U	0.41	0.041	0.44	U	U	0.44	0.044
Dichlorophenol, 2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Diethyl phthalate	mg/kg	0.41	U	U	0.41	0.082	0.44	U	U	0.44	0.088
Dimethyl phthalate	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Dimethylphenol, 2,4-	mg/kg	0.2	U	U	0.2	0.026	0.22	U	U	0.22	0.028
Di-n-butyl phthalate	mg/kg	0.41	U	U	0.41	0.082	0.44	U	U	0.44	0.088
Dinitro-2-methylphenol, 4,6-	mg/kg	0.41	U	U	0.41	0.082	0.44	U	U	0.44	0.088
Dinitrophenol, 2,4-	mg/kg	1	U	U	1	0.41	1.1	U	U	1.1	0.44
Dinitrotoluene, 2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Dinitrotoluene, 2,6-	mg/kg	0.2	U	U	0.2	0.024	0.22	U	U	0.22	0.026
Di-n-octyl phthalate	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Fluoranthene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Fluorene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Hexachlorobenzene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Hexachlorobutadiene	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Hexachlorocyclopentadiene	mg/kg	0.2	U	U	0.2	0.09	0.22	U	U	0.22	0.097
Hexachloroethane	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Isophorone	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Methylnaphthalene, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Methylphenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Naphthalene	mg/kg	0.2	U	U	0.2	0.033	0.22	U	U	0.22	0.035
Nitroaniline, 2-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Nitroaniline, 3-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Nitroaniline, 4-	mg/kg	0.2	U	U	0.2	0.041	0.22	U	U	0.22	0.044
Nitrobenzene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Nitrophenol, 2-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Nitrophenol, 4-	mg/kg	1	U	U	1	0.16	1.1	U	U	1.1	0.18
n-Nitroso-di-n-propylamine	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
n-Nitrosodiphenylamine	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Pentachlorophenol	mg/kg	1	U	U	1	0.24	1.1	U	U	1.1	0.27
Phenanthrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Phenol	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Pyrene	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Trichlorobenzene, 1,2,4-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Trichlorophenol, 2,4,5-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022
Trichlorophenol, 2,4,6-	mg/kg	0.2	U	U	0.2	0.02	0.22	U	U	0.22	0.022

FD - Field duplicate.
LQ - Laboratory qualifier.
MDL - Method detection limit.
mg/kg - Milligram(s) per kologram.
REG - Regular sample.
RL - Reporting limit.
VQ - Validation qualifier.

Validation Qualifiers:
U - Nondetect.
J - Estimated Concentration.
UJ - Nondetected; detection limit is estimated.
B - Analyte also found in blank.
R - Rejected.

APPENDIX B

ProUCL OUTPUT FOR UPPER CONFIDENCE LIMITS ON THE MEAN

Data Input for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample ID	Benzo(a)anthracene	D_Benzo(a)anthracene	Benzo(a)pyrene	D_Benzo(a)pyrene	Benzo(b)fluoranthene	D_Benzo(b)fluoranthene
CY0031	0.407	1	0.326	1	0.414	1
CY0032CY0033	0.021	0	0.021	0	0.021	0
CY0035	0.02	0	0.02	0	0.02	0
CY0036	0.348	1	0.403	1	0.582	1
CY0037	0.02	0	0.02	0	0.02	0
CY0038	0.022	0	0.022	0	0.022	0
CY0039	0.0366	1	0.032	1	0.0291	1
CY0040	0.02	0	0.02	0	0.02	0
CY0041	0.021	0	0.021	0	0.021	0
CY0042	0.02	0	0.02	0	0.02	0
CY0043	0.02	0	0.02	0	0.02	0
CY0044	0.022	0	0.022	0	0.022	0

Data Input for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Dibenz(a,h)anthracene	D_Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	D_Indeno(1,2,3-cd)pyrene
0.0416	1	0.223	1
0.021	0	0.021	0
0.02	0	0.02	0
0.0589	1	0.294	1
0.02	0	0.02	0
0.022	0	0.022	0
0.02	0	0.0255	1
0.02	0	0.02	0
0.021	0	0.021	0
0.02	0	0.02	0
0.02	0	0.02	0
0.022	0	0.022	0

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	
From File	HH TS input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Benzo(a)anthracene

General Statistics

Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0366	Minimum Detected	-3.308
Maximum Detected	0.407	Maximum Detected	-0.899
Mean of Detected	0.264	Mean of Detected	-1.754
SD of Detected	0.199	SD of Detected	1.348
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.022	Maximum Non-Detect	-3.817

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	75.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.866	Shapiro Wilk Test Statistic	0.799
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	0.0737
SD	0.143
95% DL/2 (t) UCL	0.148
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	-3.868
SD	1.399
95% H-Stat (DL/2) UCL	0.263
Log ROS Method	
Mean in Log Scale	-5.784
SD in Log Scale	2.861
Mean in Original Scale	0.0675
SD in Original Scale	0.146
95% t UCL	0.143
95% Percentile Bootstrap UCL	0.137
95% BCA Bootstrap UCL	0.163
95% H-UCL	69.65

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0934
SD	0.128
SE of Mean	0.0451
95% KM (t) UCL	0.174
95% KM (z) UCL	0.168
95% KM (jackknife) UCL	0.294
95% KM (bootstrap t) UCL	0.128
95% KM (BCA) UCL	0.407
95% KM (Percentile Bootstrap) UCL	0.407
95% KM (Chebyshev) UCL	0.29
97.5% KM (Chebyshev) UCL	0.375
99% KM (Chebyshev) UCL	0.542

Potential UCLs to Use

95% KM (t) UCL	0.174
95% KM (Percentile Bootstrap) UCL	0.407

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

General Statistics

Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.032	Minimum Detected	-3.442
Maximum Detected	0.403	Maximum Detected	-0.909
Mean of Detected	0.254	Mean of Detected	-1.824
SD of Detected	0.196	SD of Detected	1.405
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.022	Maximum Non-Detect	-3.817

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	75.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.898	Shapiro Wilk Test Statistic	0.812
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0712	Mean	-3.886
SD	0.138	SD	1.381
95% DL/2 (t) UCL	0.143	95% H-Stat (DL/2) UCL	0.243

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Log ROS Method	
Mean in Log Scale	-6.072
SD in Log Scale	3.015
Mean in Original Scale	0.0646
SD in Original Scale	0.141
95% t UCL	0.138
95% Percentile Bootstrap UCL	0.131
95% BCA Bootstrap UCL	0.156
95% H-UCL	154.9

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0874
SD	0.125
SE of Mean	0.0442
95% KM (t) UCL	0.167
95% KM (z) UCL	0.16
95% KM (jackknife) UCL	0.277
95% KM (bootstrap t) UCL	0.119
95% KM (BCA) UCL	0.403
95% KM (Percentile Bootstrap) UCL	0.403
95% KM (Chebyshev) UCL	0.28
97.5% KM (Chebyshev) UCL	0.363
99% KM (Chebyshev) UCL	0.527

Potential UCLs to Use

95% KM (t) UCL	0.167
95% KM (Percentile Bootstrap) UCL	0.403

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Benzo(b)fluoranthene

General Statistics

Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0291	Minimum Detected	-3.537
Maximum Detected	0.582	Maximum Detected	-0.541
Mean of Detected	0.342	Mean of Detected	-1.653
SD of Detected	0.283	SD of Detected	1.64
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.022	Maximum Non-Detect	-3.817

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	75.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.951	Shapiro Wilk Test Statistic	0.834
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0932	Mean	-3.843
SD	0.193	SD	1.495
95% DL/2 (t) UCL	0.193	95% H-Stat (DL/2) UCL	0.377

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Log ROS Method	
Mean in Log Scale	-6.697
SD in Log Scale	3.577
Mean in Original Scale	0.0861
SD in Original Scale	0.196
95% t UCL	0.188
95% Percentile Bootstrap UCL	0.183
95% BCA Bootstrap UCL	0.229
95% H-UCL	7138

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.107
SD	0.178
SE of Mean	0.063
95% KM (t) UCL	0.22
95% KM (z) UCL	0.211
95% KM (jackknife) UCL	0.358
95% KM (bootstrap t) UCL	0.148
95% KM (BCA) UCL	0.582
95% KM (Percentile Bootstrap) UCL	N/A
95% KM (Chebyshev) UCL	0.382
97.5% KM (Chebyshev) UCL	0.5
99% KM (Chebyshev) UCL	0.734

Potential UCLs to Use

95% KM (t) UCL	0.22
95% KM (Percentile Bootstrap) UCL	N/A

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Dibenz(a,h)anthracene

General Statistics

Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0416	Minimum Detected	-3.18
Maximum Detected	0.0589	Maximum Detected	-2.832
Mean of Detected	0.0503	Mean of Detected	-3.006
SD of Detected	0.0122	SD of Detected	0.246
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.022	Maximum Non-Detect	-3.817

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	83.33%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.017	Mean	-4.315
SD	0.016	SD	0.617
95% DL/2 (t) UCL	0.0252	95% H-Stat (DL/2) UCL	0.0248
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Mean in Original Scale	N/A
SD in Original Scale	N/A
95% t UCL	N/A
95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A
95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	0.043
SD	0.00478
SE of Mean	0.00195
95% KM (t) UCL	0.0465
95% KM (z) UCL	0.0463
95% KM (jackknife) UCL	0.0549
95% KM (bootstrap t) UCL	N/A
95% KM (BCA) UCL	N/A
95% KM (Percentile Bootstrap) UCL	0.0589
95% KM (Chebyshev) UCL	0.0516
97.5% KM (Chebyshev) UCL	0.0552
99% KM (Chebyshev) UCL	0.0625

Potential UCLs to Use

95% KM (t) UCL	0.0465
95% KM (% Bootstrap) UCL	0.0589

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Indeno(1,2,3-cd)pyrene

General Statistics

Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0255	Minimum Detected	-3.669
Maximum Detected	0.294	Maximum Detected	-1.224
Mean of Detected	0.181	Mean of Detected	-2.131
SD of Detected	0.139	SD of Detected	1.339
Minimum Non-Detect	0.02	Minimum Non-Detect	-3.912
Maximum Non-Detect	0.022	Maximum Non-Detect	-3.817

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	75.00%

Warning: There are only 3 Distinct Detected Values in this data set
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.931	Shapiro Wilk Test Statistic	0.834
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.053	Mean	-3.963
SD	0.0973	SD	1.244
95% DL/2 (t) UCL	0.103	95% H-Stat (DL/2) UCL	0.146

Data Output for ProUCL
Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Log ROS Method	
Mean in Log Scale	-6.247
SD in Log Scale	2.919
Mean in Original Scale	0.0462
SD in Original Scale	0.101
95% t UCL	0.0983
95% Percentile Bootstrap UCL	0.0949
95% BCA Bootstrap UCL	0.113
95% H-UCL	65.61

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A
K-S Test Statistic	N/A
5% K-S Critical Value	N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	N/A
Maximum	N/A
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
AppChi2	N/A
95% Gamma Approximate UCL (Use when n >= 40)	N/A
95% Adjusted Gamma UCL (Use when n < 40)	N/A

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	0.0643
SD	0.088
SE of Mean	0.0311
95% KM (t) UCL	0.12
95% KM (z) UCL	0.116
95% KM (jackknife) UCL	0.193
95% KM (bootstrap t) UCL	0.085
95% KM (BCA) UCL	0.294
95% KM (Percentile Bootstrap) UCL	0.294
95% KM (Chebyshev) UCL	0.2
97.5% KM (Chebyshev) UCL	0.259
99% KM (Chebyshev) UCL	0.374

Potential UCLs to Use

95% KM (t) UCL	0.12
95% KM (Percentile Bootstrap) UCL	0.294

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX C

RISK CHARACTERIZATION SPREADSHEETS

Table C-1

Groundskeeper, Current Scenarios, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	1.42E-07	3.98E-07	1.04E-07	NA	1.06E-08	1.22E-07	3.42E-07	8.91E-08	NA
Benzo(a)pyrene	4.03E-01	1.41E-07	3.94E-07	1.03E-06	NA	1.05E-08	1.21E-07	3.38E-07	8.82E-07	NA
Benzo(b)fluoranthene	5.82E-01	2.03E-07	5.69E-07	1.48E-07	NA	1.51E-08	1.75E-07	4.89E-07	1.27E-07	NA
Dibenz(a,h)anthracene	5.89E-02	2.06E-08	5.76E-08	1.50E-07	NA	1.53E-09	1.77E-08	4.94E-08	1.29E-07	NA
Indeno(1,2,3-cd)pyrene	2.94E-01	1.03E-07	2.88E-07	7.50E-08	NA	7.64E-09	8.82E-08	2.47E-07	6.44E-08	NA
Total ILCR or HI				**1.51E-06**	**NA**				**1.29E-06**	**NA**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/m^3 - Milligram per cubic meter.

Table C-1

Groundskeeper, Current Scenarios, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Semivolatile Organic Compounds							
Benzo(a)anthracene	4.07E-08	2.84E-09	7.96E-09	8.82E-10	NA	**1.94E-07**	**NA**
Benzo(a)pyrene	4.03E-08	2.82E-09	7.89E-09	8.73E-09	NA	**1.92E-06**	**NA**
Benzo(b)fluoranthene	5.82E-08	4.07E-09	1.14E-08	1.26E-09	NA	**2.77E-07**	**NA**
Dibenz(a,h)anthracene	5.89E-09	4.12E-10	1.15E-09	1.28E-09	NA	**2.80E-07**	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-08	2.05E-09	5.75E-09	6.37E-10	NA	**1.40E-07**	**NA**
Total ILCR or HI				**1.28E-08**	**NA**	**2.81E-06**	**NA**

EPC - Exposure Point Concentration
ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table C-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

(Page 1 of 2)

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC [a] mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	1.42E-07	3.98E-07	1.04E-07	NA	1.06E-08	1.22E-07	3.42E-07	8.91E-08	NA
Benzo(a)pyrene	4.03E-01	1.41E-07	3.94E-07	1.03E-06	NA	1.05E-08	1.21E-07	3.38E-07	8.82E-07	NA
Benzo(b)fluoranthene	5.82E-01	2.03E-07	5.69E-07	1.48E-07	NA	1.51E-08	1.75E-07	4.89E-07	1.27E-07	NA
Dibenz(a,h)anthracene	5.89E-02	2.06E-08	5.76E-08	1.50E-07	NA	1.53E-09	1.77E-08	4.94E-08	1.29E-07	NA
Indeno(1,2,3-cd)pyrene	2.94E-01	1.03E-07	2.88E-07	7.50E-08	NA	7.64E-09	8.82E-08	2.47E-07	6.44E-08	NA
Total ILCR or HI				**1.51E-06**	**NA**				**1.29E-06**	**NA**

[a] Surface soil exposure point concentrations (EPC) are used for total soil. See Section 2.5 of the text for further information.

ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/m^3 - Milligram per cubic meter.

Table C-2

Groundskeeper, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Semivolatile Organic Compounds							
Benzo(a)anthracene	4.07E-08	2.84E-09	7.96E-09	8.82E-10	NA	**1.94E-07**	**NA**
Benzo(a)pyrene	4.03E-08	2.82E-09	7.89E-09	8.73E-09	NA	**1.92E-06**	**NA**
Benzo(b)fluoranthene	5.82E-08	4.07E-09	1.14E-08	1.26E-09	NA	**2.77E-07**	**NA**
Dibenz(a,h)anthracene	5.89E-09	4.12E-10	1.15E-09	1.28E-09	NA	**2.80E-07**	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-08	2.05E-09	5.75E-09	6.37E-10	NA	**1.40E-07**	**NA**
Total ILCR or HI				**1.28E-08**	**NA**	**2.81E-06**	**NA**

ILCR - Incremental Lifetime Cancer Risk
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - milligram per kilogram
mg/m^3 - milligram per cubic meter

Table C-3

Indoor Worker, Future Scenario, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion					
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	**Total ILCR**	**Total HI**
Semivolatile Organic Compounds							
Benzo(a)anthracene	4.07E-01	7.11E-08	1.99E-07	5.19E-08	NA	**5.19E-08**	**NA**
Benzo(a)pyrene	4.03E-01	7.04E-08	1.97E-07	5.14E-07	NA	**5.14E-07**	**NA**
Benzo(b)fluoranthene	5.82E-01	1.02E-07	2.85E-07	7.42E-08	NA	**7.42E-08**	**NA**
Dibenz(a,h)anthracene	5.89E-02	1.03E-08	2.88E-08	7.51E-08	NA	**7.51E-08**	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-01	5.14E-08	1.44E-07	3.75E-08	NA	**3.75E-08**	**NA**
Total ILCR or HI						**7.53E-07**	**NA**

EPC - Exposure Point Concentration.
ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.

Table C-4

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC [a] mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	ILCR	HQ
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	9.39E-09	1.31E-06	6.85E-09	NA	1.59E-08	3.66E-09	5.11E-07	2.67E-09	NA
Benzo(a)pyrene	4.03E-01	9.29E-09	1.30E-06	6.79E-08	NA	1.57E-08	3.62E-09	5.06E-07	2.65E-08	NA
Benzo(b)fluoranthene	5.82E-01	1.34E-08	1.87E-06	9.80E-09	NA	2.27E-08	5.24E-09	7.31E-07	3.82E-09	NA
Dibenz(a,h)anthracene	5.89E-02	1.36E-09	1.90E-07	9.92E-09	NA	2.30E-09	5.30E-10	7.40E-08	3.87E-09	NA
Indeno(1,2,3-cd)pyrene	2.94E-01	6.78E-09	9.47E-07	4.95E-09	NA	1.15E-08	2.64E-09	3.69E-07	1.93E-09	NA
Total ILCR or HI				**9.94E-08**	**NA**				**3.88E-08**	**NA**

[a] Surface soil exposure point concentrations (EPC) are used for total soil. See Section 2.5 of the text for further information.

ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/m^3 - Milligram per cubic meter.

Table C-4

Construction Worker, Current and Future Scenarios, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Cancer Dose mg/kg-day	Inhalation Noncancer Dose mg/kg-day	Inhalation ILCR	Inhalation HQ	**All Pathways Total ILCR**	**All Pathways Total HI**
Semivolatile Organic Compounds							
Benzo(a)anthracene	1.42E-07	1.99E-10	2.78E-08	6.17E-11	NA	**9.59E-09**	**NA**
Benzo(a)pyrene	1.41E-07	1.97E-10	2.75E-08	6.11E-10	NA	**9.49E-08**	**NA**
Benzo(b)fluoranthene	2.04E-07	2.85E-10	3.98E-08	8.83E-11	NA	**1.37E-08**	**NA**
Dibenz(a,h)anthracene	2.06E-08	2.88E-11	4.02E-09	8.93E-11	NA	**1.39E-08**	**NA**
Indeno(1,2,3-cd)pyrene	1.03E-07	1.44E-10	2.01E-08	4.46E-11	NA	**6.93E-09**	**NA**
Total ILCR or HI				**8.95E-10**	**NA**	**1.39E-07**	**NA**

[a] Surface soil exposure point concentrations

ILCR - Incremental Lifetime Cancer Risk.
HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/m^3 - Milligram per cubic meter.

Table C-5

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion			Dermal Contact				
	EPC [a]	Adult Dose	Child Dose	Resident	Adult Dose Absorbed	Adult Dose	Child Dose Absorbed	Child Dose	Resident
Chemicals of Potential Concern	mg/kg	mg/kg-day	mg/kg-day	ILCR	mg/cm^2-day	mg/kg-day	mg/cm^2-day	mg/kg-day	ILCR
Semivolatile Organic Compounds									
Benzo(a)anthracene	4.07E-01	1.72E-07	4.01E-07	4.19E-07	3.70E-09	9.92E-08	1.06E-08	1.62E-07	1.91E-07
Benzo(a)pyrene	4.03E-01	1.70E-07	3.97E-07	4.15E-06	3.67E-09	9.82E-08	1.05E-08	1.61E-07	1.89E-06
Benzo(b)fluoranthene	5.82E-01	2.46E-07	5.74E-07	5.99E-07	5.30E-09	1.42E-07	1.51E-08	2.32E-07	2.73E-07
Dibenz(a,h)anthracene	5.89E-02	2.49E-08	5.81E-08	6.06E-07	5.36E-10	1.43E-08	1.53E-09	2.35E-08	2.76E-07
Indeno(1,2,3-cd)pyrene	2.94E-01	1.24E-07	2.90E-07	3.02E-07	2.68E-09	7.16E-08	7.64E-09	1.17E-07	1.38E-07
Total ILCR				**6.07E-06**					**2.77E-06**

[a] Surface soil exposure point concentrations (EPC) are used for total soil. See Section 2.5 of the text for further information.

ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.
mg/m^3 - Milligram per cubic meter.

Table C-5

On-Site Resident, Cancer Risk, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemicals of Potential Concern	Concentration in Air C_a mg/m^3	Inhalation Adult Dose mg/kg-day	Inhalation Child Dose mg/kg-day	Inhalation Resident ILCR	**All Pathways Total ILCR**
Semivolatile Organic Compounds					
Benzo(a)anthracene	8.02E-10	7.53E-11	4.39E-11	3.70E-11	**6.10E-07**
Benzo(a)pyrene	7.94E-10	7.46E-11	4.35E-11	3.66E-10	**6.04E-06**
Benzo(b)fluoranthene	1.15E-09	1.08E-10	6.28E-11	5.29E-11	**8.72E-07**
Dibenz(a,h)anthracene	1.16E-10	1.09E-11	6.36E-12	5.35E-11	**8.82E-07**
Indeno(1,2,3-cd)pyrene	5.79E-10	5.44E-11	3.17E-11	2.67E-11	**4.40E-07**
Total ILCR				**5.36E-10**	**8.84E-06**

[a] Surface soil exposure point concentrations

ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.
mg/m^3 - Milligram per cubic meter.

Table C-6

On-Site Child Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC [a]	Child Dose	Child Resident	Dose Absorbed	Child Dose	Child Resident	in Air C_a	Child Dose	Child Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	4.68E-06	NA	1.06E-08	1.89E-06	NA	8.02E-10	5.12E-10	NA	**NA**
Benzo(a)pyrene	4.03E-01	4.64E-06	NA	1.05E-08	1.88E-06	NA	7.94E-10	5.07E-10	NA	**NA**
Benzo(b)fluoranthene	5.82E-01	6.70E-06	NA	1.51E-08	2.71E-06	NA	1.15E-09	7.33E-10	NA	**NA**
Dibenz(a,h)anthracene	5.89E-02	6.78E-07	NA	1.53E-09	2.74E-07	NA	1.16E-10	7.42E-11	NA	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-01	3.38E-06	NA	7.64E-09	1.37E-06	NA	5.79E-10	3.70E-10	NA	**NA**
Total HI			**NA**			**NA**			**NA**	**NA**

[a] Surface soil exposure point concentrations (EPC) are used for total soil. See Section 2.5 of the text for further information.

HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.
mg/m^3 - Milligram per cubic meter.

Table C-7

On-Site Adult Resident, Noncancer Risk, Future Scenario, Exposure to Total Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion		Dermal Contact			Concentration	Inhalation		**All**
	EPC [a]	Adult Dose	Adult Resident	Dose Absorbed	Adult Dose	Adult Resident	in Air C_a	Adult Dose	Adult Resident	**Pathways Total**
Chemicals of Potential Concern	mg/kg	mg/kg-day	HQ	mg/cm^2-day	mg/kg-day	HQ	mg/m^3	mg/kg-day	HQ	**HI**
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	5.02E-07	NA	3.70E-09	2.89E-07	NA	8.02E-10	2.20E-10	NA	**NA**
Benzo(a)pyrene	4.03E-01	4.97E-07	NA	3.67E-09	2.86E-07	NA	7.94E-10	2.17E-10	NA	**NA**
Benzo(b)fluoranthene	5.82E-01	7.18E-07	NA	5.30E-09	4.14E-07	NA	1.15E-09	3.14E-10	NA	**NA**
Dibenz(a,h)anthracene	5.89E-02	7.26E-08	NA	5.36E-10	4.19E-08	NA	1.16E-10	3.18E-11	NA	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-01	3.62E-07	NA	2.68E-09	2.09E-07	NA	5.79E-10	1.59E-10	NA	**NA**
Total HI			**NA**			**NA**			**NA**	**NA**

[a] Surface soil exposure point concentrations (EPC) are used for total soil. See Section 2.5 of the text for further information.

HQ - Hazard Quotient; HI - Hazard Index
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.
mg/m^3 - Milligram per cubic meter.

Table C-8

Adult Hunter, Future Scenario, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Incidental Ingestion				Dermal Contact				
Chemicals of Potential Concern	EPC mg/kg	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	Adult Hunter ILCR	Adult Hunter HQ	Dose Absorbed mg/cm^2-day	Cancer Dose mg/kg-day	Noncancer Dose mg/kg-day	Adult Hunter ILCR	Adult Hunter HQ
Semivolatile Organic Compounds										
Benzo(a)anthracene	4.07E-01	9.56E-09	2.23E-08	6.98E-09	NA	1.06E-08	8.20E-09	1.91E-08	5.99E-09	NA
Benzo(a)pyrene	4.03E-01	9.46E-09	2.21E-08	6.91E-08	NA	1.05E-08	8.12E-09	1.89E-08	5.93E-08	NA
Benzo(b)fluoranthene	5.82E-01	1.37E-08	3.19E-08	9.98E-09	NA	1.51E-08	1.17E-08	2.74E-08	8.56E-09	NA
Dibenz(a,h)anthracene	5.89E-02	1.38E-09	3.23E-09	1.01E-08	NA	1.53E-09	1.19E-09	2.77E-09	8.66E-09	NA
Indeno(1,2,3-cd)pyrene	2.94E-01	6.90E-09	1.61E-08	5.04E-09	NA	7.64E-09	5.92E-09	1.38E-08	4.32E-09	NA
Total ILCR and HI				**1.01E-07**	**NA**				**8.68E-08**	**NA**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.

Table C-8

Adult Hunter, Future Scenario, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

	Concentration in Forage C_p	Concentration in Venison C_v	Consumption of Venison				**All Pathways**	
			Cancer Dose	Noncancer Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Semivolatile Organic Compounds								
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	**1.30E-08**	**NA**
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	**1.28E-07**	**NA**
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	**1.85E-08**	**NA**
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	**1.88E-08**	**NA**
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	**9.36E-09**	**NA**
Total ILCR and HI					**NA**	**NA**	**1.88E-07**	**NA**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligram per kilogram.
mg/cm^2 - Milligram per square meter.

Table C-9

Hunter's Child, Future Scenario, Exposure to Surface Soil
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

		Concentration in Forage	Concentration in Venison	Consumption of Venison					
	EPC	C_p	C_v	Cancer Dose	Noncancer Dose			**Total**	**Total**
Chemicals of Potential Concern	mg/kg	mg/kg	mg/kg	mg/kg-day	mg/kg-day	ILCR	HQ	**ILCR**	**HI**
Semivolatile Organic Compounds									
Benzo(a)anthracene	4.07E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Benzo(a)pyrene	4.03E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Benzo(b)fluoranthene	5.82E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Dibenz(a,h)anthracene	5.89E-02	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Indeno(1,2,3-cd)pyrene	2.94E-01	NA	NA	NA	NA	NA	NA	**NA**	**NA**
Total ILCR and HI						**NA**	**NA**	**NA**	**NA**

EPC - Exposure Point Concentration.
HQ - Hazard Quotient; HI - Hazard Index
ILCR - Incremental Lifetime Cancer Risk.
mg/kg - Milligram per kilogram.

RESPONSE TO COMMENTS

Responses to Ohio Environmental Protection Agency Comments on the Draft Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 and the BHHRA and Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio, Dated June 12, 2013

The BHHRA and SLERA documents were reviewed by Ohio EPA, who had no comments as indicated by correspondence received from Paul Jayko on August 6, 2013.

APPENDIX K

ASH PIT NO. 3 SLERA ADDENDUM FOR COAL YARD NO. 3

Shaw Environmental
& Infrastructure, Inc.

Final
October 2013

Ash Pit No. 3
Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 3
FUDS Project No. G05OH001821

Former Plum Brook Ordnance Works
Sandusky, Ohio

US Army Corps of Engineers
Nashville District

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October 30, 2013

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-E (Ms. Paula Coleman)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Subject: ***Submittal of the Final Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 and the BHHRA and Screening-Level Ecological Risk Assessment Addenda for Coal Yard No. 3***
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. W912QR-08-D-0013: Shaw Project Number 132457

Dear Ms. Coleman:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. W912QR-08-D-0013 awarded to Shaw Environmental & Infrastructure, Inc., a CB&I company, we are pleased to submit the Final Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 (AP3), and the final Addenda to the AP3 BHHRA and Screening-Level Ecological Risk Assessment for Coal Yard No. 3 at the Former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. This report was prepared consistent with other PBOW risk assessment reports, U.S. Environmental Protection Agency guidance, and the AP3 risk assessment work plan.

Enclosed for your records are four copies of this report. Copies have also been sent to those on the distribution list as indicated for their records. As requested, the document was sent to the Center of Expertise (CX) and the Restoration Advisory Board Co-Chair in electronic format only.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven. T. Downey, PE, PMP
Project Manager

Please Reply To: Steven T. Downey
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DISCIPLINE SIGN-OFF REVIEW

Shaw Environmental & Infrastructure, Inc.

Client Name: U.S. Army Engineer District, Nashville; CELRN-EC-E

Project Description: Ash Pit No. 3 SLERA Addendum for Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Contract No. W912QR-08-D-0013

Delivery Order No. DX02

Project No. 132457

Task/Phase Number: 42000000

Document Type		Identify specific section or segment covered by this checkprint	Document Origin
☐	Technical / Cost Proposal		X Originator Developed
☐	RFP		☐ Edited Standard
☐	Contract / Subcontract		☐ Client Furnished
☐	Work Plans		
X	Report	SLERA Addendum	**Document Status**
☐	Risk Assessment / Evaluation		☐ Preliminary
☐	Specifications & Plans		☐ Internal Draft
☐	Design Calculations		☐ Draft
☐	Tables		☐ Draft Final
☐	Drawings / Figures		X Final
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NOTICE: By signature above, parties certify that the subject document has been prepared by and/or reviewed by them (as appropriate), that all review comments have been resolved, and that the document is ready for submittal.

Final

Ash Pit No. 3
Screening-Level Ecological Risk Assessment Addendum
for Coal Yard No. 3
FUDS Project No. G05OH001821

Plum Brook Ordnance Works,
Sandusky, Ohio

Prepared for:

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October 2013

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List of Acronyms

AP3	Ash Pit No. 3
BSC	background screening concentration
COPEC	chemical of potential ecological concern
EPA	U.S. Environmental Protection Agency
ESV	ecological screening value
ICI	International Consultants Incorporated
IT	IT Corporation
MDC	maximum detected concentration
NASA	National Aeronautics and Space Administration
NWI	National Wetlands Inventory
OEPA	Ohio Environmental Protection Agency
PBOW	Plum Brook Ordnance Works
Shaw	Shaw Environmental & Infrastructure, Inc.
SLERA	screening-level ecological risk assessment
TNT	trinitrotoluene
TNTA	TNT Area A
TNTB	TNT Area B
TNTC	TNT Area C
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers

Executive Summary

A screening-level ecological risk assessment (SLERA) was performed to provide an estimate of current and future ecological hazard associated with potential hazardous substance releases within the Ash Pit No. 3 Coal Yard (Coal Yard No. 3) site at Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio. Coal Yard No. 3 is associated with Ash Pit No. 3 at PBOW, and this SLERA is an addendum to the Ash Pit No. 3 SLERA. The results of the SLERA contribute to the overall characterization of the site and serve as part of the baseline used to develop, evaluate, and select appropriate remedial alternatives, if necessary. The objective of the SLERA is to present information for risk managers regarding the potential for adverse impacts to occur to ecological receptors as a result of site-related releases. Although the term "ecological risk assessment" is commonly used in guidance documents and available technical literature, it should be noted that ecological "risk" is not calculated in the SLERA, as no statistical probabilities of toxicological effects are generated in the SLERA. The assessment addresses the potential for adverse effects to the vegetation, wildlife, aquatic life, and endangered and threatened species.

The maximum detected concentrations of chemicals in soil were compared with risk-based screening ecotoxicity values during an initial screening step. Chemicals that exceeded the screening values (or for which no screening values were available) and that did not meet additional screening criteria (e.g., comparison with background data, nutrient status, frequency of detection, etc.) were retained as chemicals of potential ecological concern (COPEC) and assessed further. It is noted that the background screening protocol used in this assessment, which is based on PBOW Project Delivery Team agreement, differs somewhat from the current Ohio Environmental Protection Agency guidance.

Because of the small size of the site, the site is not spatially relevant to any significant degree for most ecological receptors. However, it is important to note that the site-specific SLERA was performed to satisfy administrative requirements, including FUDS regulations. Following the screening step, no chemicals were identified as COPECs in soil at Coal Yard No. 3. Therefore, the SLERA process was terminated after the initial screening step. Based on the findings of the SLERA, the potential for adverse effects to populations of ecological receptors exposed to chemicals in soil at the Coal Yard No. 3 is expected to be negligible.

1.0 Introduction

This screening-level ecological risk assessment (SLERA) addendum evaluates the potential for adverse effects posed to ecological receptors from potential releases at the Ash Pit No. 3 (AP3) Coal Yard (Coal Yard No. 3) at the former Plum Brook Ordnance Works (PBOW). Coal Yard No. 3 is associated with AP3 at PBOW both spatially and due to shared historical operations; thus, this SLERA is performed as an addendum to the AP3 SLERA, which was submitted as a final report in January 2012 (Shaw Environmental & Infrastructure, Inc. [Shaw] [a CB&I company], 2012). This addendum evaluates additional soil samples that were collected from Coal Yard No. 3 in 2011. The approaches used to evaluate the potential for ecological risk are the same as those described in the AP3 SLERA work plan (Shaw, 2009). This SLERA is consistent with the ecological risk assessment process described in U.S. Environmental Protection Agency (EPA) guidance (e.g., EPA [1997]), with Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response guidance (OEPA, 2008), and with the procedures established in previous ecological risk assessments performed at PBOW (e.g., IT Corporation [IT], 2001; Shaw, 2010a), with some adjustments to accommodate current practices in the field of ecological risk assessment.

This work is being conducted by Shaw for the U.S. Army Corps of Engineers (USACE) under the Defense Environmental Restoration Program-Formerly Used Defense Sites and managed by the USACE Huntington District, with technical oversight provided by the USACE Nashville District.

1.1 Facility Description and Location

PBOW is located approximately 4 miles south of Sandusky, Ohio, and 59 miles west of Cleveland (Figure 1-1). Although located primarily in Perkins and Oxford Townships, the eastern edge of the facility extends into Huron and Milan Townships. PBOW is bounded on the north by Bogart Road, on the south by Mason Road, on the west by Patten Tract Road, and on the east by U.S. Highway 250. The areas surrounding PBOW are mostly agricultural and residential. The facility is currently surrounded by a chain-link fence, and the perimeter is regularly patrolled. Access by authorized personnel is limited to established checkpoints. Public access is restricted. Hunting is allowed by permit on portions of PBOW during the annual deer hunting season.

1.2 Facility History and Background

The PBOW facility was constructed on property comprising 9,009 acres in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene, and pentolite (International Consultants Incorporated [ICI], 1995). Production of explosives at PBOW began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic

explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNT Area A (TNTA), TNT Area B (TNTB), and TNT Area C (TNTC). Twelve process lines were used in the manufacture of TNT, including four lines at TNTA, three lines at TNTB, and five lines at TNTC.

After plant operations ceased, the manufacturing process lines were decontaminated by the War Department in late 1945. During decontamination, all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned. After decontamination, 3,230 acres of the property were initially transferred to the Ordnance Department, then to the War Assets Administration after being certified by the U.S. Army to be decontaminated. In 1949, PBOW was transferred to the General Services Administration. This transfer did not include the 2,800 acres comprising the Plum Brook Depot area, also known as the Magazine Area. The Department of the Army reacquired the 3,230 acres in 1954 and performed remedial efforts from the mid-1950s until 1963. In 1955, the Army completed further decontamination of manufacturing process lines. This effort included removal of contaminated surface and subsurface soil around the building and wooden and ceramic waste disposal lines containing TNT. Thousands of pounds of TNT were discovered in catch basins; this TNT was removed and burned at the burning grounds.

Two property use agreements were entered into by the Army and the National Advisory Committee of Aeronautics, the predecessor of the National Aeronautics and Space Administration (NASA), in 1956 and 1958, respectively. Accountability and custody for the entire portion of the former PBOW property (6,030 acres) that had been under the accountability and custody of the Department of the Army were transferred to NASA on March 15, 1963. NASA performed further decontamination efforts during 1964. The NASA decontamination process included removing contaminated surface soil above the drain tiles, flumes, etc.; destruction of all buildings by fire; and removal of all soil, debris, sumps, and above-grade portions of concrete foundations. Portions of the concrete foundations located below grade were left buried, and some that had been previously slightly above grade were likewise buried. All materials, including the soil in those areas, were flashed. The area was then rough-graded. The decontamination process was also to have included the burning of nitroaromatic-filled flumes that were excavated (Dames and Moore, Inc., 1997).

NASA has operated and maintained the former PBOW property since 1963, and the facility is currently the NASA Glenn Research Center, Plum Brook Station. NASA operates the property as a space research facility in support of the John Glenn Research Center at Lewis Field, Cleveland, Ohio. Most of the aerospace testing facilities built in the 1960s at the facility are currently on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of

PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The General Services Administration retains ownership of the remaining excess acreage and currently has a use agreement with the Ohio National Guard for 604 acres of this land. The details of land transactions are listed in the site management plan (ICI, 1995).

1.3 Coal Yard No. 3 Description and History

Three power stations, Powerhouse No. 1, Powerhouse No. 2, and Powerhouse No. 3, were constructed and utilized to support the acid, TNT, dinitrotoluene, and pentolite manufacturing processes. Each power station consisted of a main powerhouse, a coal storage area (coal yard), and two aboveground fuel storage tanks. The fuel storage tanks were surrounded by a berm to contain any potential spills or leaks. Each powerhouse building consisted of a boiler house, compressor room, electrical room, filter room, and locker room. Each building also contained two to four large coal-burning boilers, a turboelectric generator, a feed water treatment system, and several steam-driven or electric air compressors. The generated steam was used for space heating, driving compressors, and generating electrical power. As mentioned previously, the coal yards were used as storage areas providing coal to be used in the powerhouse's boilers. The coal was brought into the yards via train. Figure 1-2 shows the location of the three coal yards on PBOW property.

Former Coal Yard No. 3 is located immediately to the south of Powerhouse No. 3 and immediately east of AP3. The historical former coal yard is estimated to have been approximately 200 feet wide by 210 feet in length (approximately 1 acre). Currently, all coal besides that which has settled into the ground surface has been removed. The coal removal date is unknown. Most of the area is currently covered with grass; however, approximately the western third of the former coal yard is a paved area. Since acquisition of PBOW property by NASA in 1963, former Powerhouse No. 3 has been used for different purposes. Powerhouse No. 3 is planned for demolition by NASA in 2013. No permanent or semipermanent water bodies are present at this site; therefore, soil is the only medium evaluated in the SLERA.

1.4 Scope and Objectives

The objective of this SLERA is to provide an estimate of the potential for adverse ecological effects associated with contamination resulting from former PBOW activities at Coal Yard No. 3. The results of the SLERA will contribute to the overall characterization of the site and may be used to determine the need for additional investigations or to develop, evaluate, and select appropriate remedial alternatives. Guidance documents used to perform the SLERA include the general guidelines of the *Tri-Service Procedural Guidelines for Ecological Risk Assessments* (Wentsel, et al., 1996), as well as the *Ecological Risk Assessment Guidance for Superfund:*

Process for Designing and Conducting Ecological Risk Assessments (EPA, 1997), *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Guidance Bulletin No. 1* (EPA, 1996), and *Guidance for Conducting Ecological Risk Assessments* (OEPA, 2008). The SLERA fits into Steps 1 and 2 of the ecological risk assessment guidance for Superfund process (EPA, 1997) and Level I through a maximum of Level III evaluation using the OEPA (2008) process.

The goal of the SLERA is to evaluate the potential for adverse ecological effects to ecological receptors from site-related contaminants at Coal Yard No. 3. This objective is met by characterizing the ecological communities in the vicinity of the site, determining the particular contaminants present, identifying pathways for receptor exposure, and estimating the potential for adverse effects to identified receptors. The SLERA addresses the potential for adverse effects to the vegetation, wildlife, threatened and endangered species, and wetlands or other sensitive habitats associated with the site.

The SLERA evaluates the chemicals of potential ecological concern (COPEC), the ecosystems and receptors at risk, the ecotoxicity of the contaminants known or suspected to be present, and observed or anticipated ecological effects. This evaluation is conducted in two steps: (1) a screening assessment step, which is described in Chapter 2.0 as part of the problem formulation; and (2) a predictive assessment step. Ecological endpoints to be addressed in both steps are identified. The results and conclusions of the screening assessment determine whether a predictive assessment is needed. The criteria by which the need for a predictive assessment is measured are formalized as null hypotheses to be accepted (in which case a predictive assessment is not needed) or rejected (in which case a predictive assessment is needed). The predictive assessment includes the exposure characterization, ecological effects characterization, and risk characterization. Although the site is likely too small to be spatially relevant for most ecological receptors, the SLERA was performed to satisfy administrative requirements. Because of the lack of contamination detected at the site, the SLERA process was terminated after the initial screening assessment step during the problem formulation stage, and the predictive assessment was not performed.

2.0 Problem Formulation

The screening assessment null hypotheses are stated as follows:

- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of viable habitat for potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential ecological receptors.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential exposure pathways.
- Potential for adverse ecological effects to ecological entities at the site is minimal or nonexistent due to the lack of potential chemical stressors.

If one or more of these null hypotheses are accepted, a predictive assessment is not triggered. All four null hypotheses must be rejected for a predictive assessment to be triggered. The first three null hypotheses are tested with the results of the ecological site description, the pre-assessment reconnaissance, the documentation of potential receptors of special concern and critical habitats, and the determination of significant ecological threats (Section 2.1). The fourth null hypothesis is tested with the results of COPEC selection (Section 2.2).

If a predictive assessment is triggered, terrestrial ecological conceptual site models are developed, as appropriate, and additional problem formulation tasks are performed.

2.1 Ecological Site Description

This ecological site description includes a general discussion of site background and the area of concern, surface water resources (if any), wetlands, and vegetative communities; a species inventory; and a discussion of threatened and endangered species. Ecological characterization of the study area was based on a compilation of existing ecological information and site reconnaissance activities.

Because Coal Yard No. 3 is in such close proximity to AP3, a formal ecological reconnaissance was not performed separately for Coal Yard No. 3. Rather, the habitat description, sensitive ecological resources, and faunal assemblages (including potential threatened and endangered species) described in the AP3 SLERA (Shaw, 2012) were determined to also be relevant for the Coal Yard No. 3 site. Of particular note is the presence of an active bald eagle (*Haliaeetus leucocephalus*) nest at AP3. The bald eagle is a state-threatened species. More information on the

presence of bald eagles is presented in the AP3 SLERA (Shaw, 2012). Field activities at Coal Yard No. 3 were planned and coordinated to reduce disturbance around the bald eagle nest, particularly during the nesting season (e.g., the soil samples were collected in December of 2011, well after juvenile eaglets had fledged).

A trained ecologist visited Coal Yard No. 3 in September 2011 to make general observations of site conditions. Photographs taken during this visit are presented on Figure 2-1.

General Site Background. PBOW is approximately 6,400 acres in size and located within the Eastern Lake Plains physiographic region of the Eastern Huron/Erie Lake Plain Ecoregion (Lafferty, 1979; Omernik, 1986). This region is generally characterized as containing flat plains as the predominant land surface form and having a dominant natural vegetation of elm and ash in undisturbed areas. Approximately two-thirds of Erie County was once covered by a glacial lake that produced features such as beach ridges and wave-cut cliffs. Much of the region is poorly drained due to the flat topography and low stream gradients. Many of the wetlands adjacent to Lake Erie in this region have been preserved by various federal, state, and private organizations (Peterjohn and Rice, 1991), providing important wetland habitat for wildlife.

Across PBOW, the land slopes gently to the north-northeast towards Lake Erie. Elevations range from 675 feet above mean sea level at the southwest edge of the site to 625 feet above mean sea level in the northern portion of the property at Bogart Road, resulting in an average slope of approximately 0.3 percent. The Lake Plains region itself is over 69 percent cropland, 2.7 percent pasture land, and 10.5 percent forest (Ohio Department of Natural Resources, 1985). However, since the U.S. Army acquired the site in 1941 and removed the land from agricultural production, undeveloped portions of the former PBOW have become second-generation forest and open fields. This has resulted in PBOW becoming an island of forest and open fields within a sea of agricultural and residential land in north-central Ohio.

As noted in Section 1.3, Coal Yard No. 3 is located south of Powerhouse No. 3. Figure 1-2 shows the specific site location and general site features with ground surface topography. Descriptions and information regarding the local geography, topography, surface drainage, regional and local geology and hydrogeology characteristics, and precipitation influence effects on local water levels have been prepared and included in the final Ash Pit No. 3 Site Characterization Report (Shaw, 2010b). Descriptions of the ecological resources in the vicinity of Coal Yard No. 3, including common flora and fauna species in the area, discussion of threatened or endangered species, and local habitats are included in the AP3 SLERA (Shaw, 2012).

The Coal Yard No. 3 area is covered almost entirely by herbaceous vegetation, with a few small- to mid-sized trees also present (Figure 2-1). The former Coal Yard No. 3 area has minimal relief, and no water bodies are present at the site.

According to the National Wetland Inventory (NWI) maps for the area (U.S. Fish and Wildlife Service, 2013), there are no designated wetlands at the Coal Yard No. 3 site. It should be noted that the accuracy of NWI maps is limited, especially in relatively flat landscapes such as PBOW, because minor depressions often contain isolated wetlands not easily identified through aerial photograph interpretation (the process used by the U.S. Fish and Wildlife Service in preparing NWI maps). NASA is currently performing a wetland delineation study at PBOW. This delineation effort was not complete at the time of this SLERA's submittal. The delineation effort will better identify locations and extent of sensitive wetland habitat throughout the installation.

2.2 Selection of Chemicals of Potential Ecological Concern

A list of the Coal Yard No. 3 soil samples used for the SLERA is presented in Table 2-1. Sample locations are presented on Figure 2-2. From the chemical results of samples listed in Table 2-1, a COPEC selection process was performed to develop a subset of chemicals detected at the site that are potentially site-related. Selected COPECs are also present at sufficient frequencies, concentrations, and spatial areas to pose a potential risk to ecological receptors. Examples of screening criteria that were used include the following: analytical detection limit, frequency of detection less than 5 percent, comparability with background, status as a nutrient, and comparison with risk-based screening ecotoxicity values. The COPEC selection process is described in more detail in Section 2.2.3.

2.2.1 Data Organization

Chemical analytical data were reviewed and evaluated for quality, usefulness, and uncertainty. Data identified as being of acceptable quality for use in the SLERA were summarized in a manner that presents the pertinent information to be applied in the SLERA. Any data rejected during the data evaluation as a result of the data evaluation ("R"-qualified data) were identified along with the rejection rationale. All data used in the SLERA were validated.

For ecological impacts, soil from 0 to 6 feet below ground surface was used. The 0 to 6 feet depth interval was selected for three primary reasons: (1) to maintain consistency with other PBOW ecological risk assessments (e.g., IT [2001]), (2) to include potential exposure to ecological receptors that may be exposed to deeper soil, and (3) to increase the size of the total

soil database by including samples collected from 0 to 6 feet below ground surface. The data used for the SLERA are presented in Appendix A.

Chemicals not detected at least once in soil were not included in the risk assessment. Available background data were determined for soil. Potential sources of background information include data from previous and current investigations as well as monitoring wells in areas unaffected by site activities.

The analytical data included qualifiers from the analytical laboratory quality control or from the data validation process that reflect the level of confidence in the data. Some of the data qualifiers reported in the data evaluated for this SLERA and their meanings are as follows (EPA, 1989):

- U - Chemical was analyzed for but not detected; the associated value is the sample quantitation limit.
- J - Value is estimated, concentration reported above the method detection limit and below the contract-required quantitation limit.
- R - Quality control indicates that the data are unusable (chemical may or may not be present).
- B - Concentration of chemical in the sample is not sufficiently higher than concentration in the blank. If the concentration in the sample is less than 5 times the blank concentration or less than 10 times the concentration of a common laboratory contaminant, the result is given a B-qualifier and is not used in the risk assessment. Common laboratory contaminants include acetone, 2-butanone, methylene chloride, toluene, and phthalate esters (EPA, 1989).

"J"-qualified data are used in the risk assessment; "R"- and "B"-qualified data are not. The handling of "U"-qualified data (nondetects) is described in the following sections.

2.2.2 Descriptive Statistical Calculations

Because of the uncertainty associated with characterizing contamination in environmental media, both the mean and the 95 percent upper confidence limit (UCL) of the mean are usually estimated for COPECs. As described in Section 2.2.4, 95 percent UCLs were not calculated for Coal Yard No. 3. The means concentrations of detected chemicals are presented in Table 2-2; these values were calculated using the method detection limit as a surrogate concentration for nondetect results.

Analytical data from field duplicates were joined with parent sample results to yield one result for use in the generation of mean concentrations, as follows:

- The average of field duplicate and parent sample was used if both were positive detections or if both were nondetects.
- The detected value was used if one sample was a positive detection and the other was a nondetect.

2.2.3 COPEC Selection Criteria

The criteria used to identify COPECs in the SLERA are described in the following sections.

2.2.3.1 Comparison to Ecological Screening Values

Maximum detected concentrations (MDC) of chemicals detected in soil were compared with ecological screening values (ESV) for ecological endpoints following recommendations received from OEPA and as discussed in EPA *Region 5 Biological Technical Assistance Group (BTAG) Ecological Risk Assessment Bulletin No. 1* (EPA, 1996). Chemicals that exceed the ESVs, or for which no ESVs are available, are retained as COPECs if other COPEC selection criteria are also met. The following selection hierarchy was used for screening Coal Yard No. 3 soil in the ecological evaluation:

- ***Soil Screening Hierarchy.*** Soil screening values were selected using the following hierarchy:
    - EPA ecological soil screening levels (EPA, 2008)
    - *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson et al., 1997a)
    - EPA Region 5 ecological screening levels (EPA, 2003)
    - *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process* (Efroymson et al., 1997b)
    - *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants* (Efroymson et al., 1997c). It should be noted that effects on heterotrophic processes may not be relevant to ecological receptors of concern at the site.

The development of the ESVs used for the former PBOW SLERAs is presented in Appendix B.

2.2.3.2 Frequency of Detection

Chemicals that are detected infrequently may be artifacts in the data that may not reflect site-related activity or disposal practices. These chemicals are not evaluated further in the risk assessment. Generally, chemicals that are detected only at low concentrations in 5 percent or less of the samples from a given medium (if at least 20 samples are analyzed) are dropped from

further consideration, unless their presence is expected based on historical information about the site. Because fewer than 20 soil samples were collected for Coal Yard No. 3 soil, this screening criterion was not used in the SLERA.

2.2.3.3 Background Evaluation

Chemical concentrations were compared to site-specific background concentrations (see next paragraph for details) as an indication of whether a chemical is present from site-related activity or as natural background. This comparison is generally valid for inorganic chemicals but not for organic chemicals, because inorganic chemicals are naturally occurring and most organic chemicals related to potential releases are not. Statistical techniques are used as tools to aid the exercise of professional judgment in resolving site-related issues for metals, because metals are naturally present in most environmental media. The statistical techniques generally involve comparing the site data with background data.

The first statistical technique used for the background screen is the comparison of the MDC of the site data set to the PBOW background screening concentration (BSC). BSCs are considered representative concentrations of naturally occurring inorganic constituents; therefore, a comparison between the BSC and concentrations detected on site provides an indication of whether exposure to on-site media exceeds ambient levels. It is noted that the method agreed upon for the development of BSCs, as recorded in the May 10, 2000 PBOW team meeting minutes (PBOW Project Delivery Team, 2000), differs from that shown in current OEPA (2009) guidance. Use of this PBOW team method, which has been used for all PBOW risk assessments to date, ensures consistency between all of the PBOW investigative sites. The background data set and derivation of soil BSCs for all PBOW soil investigations are described in IT (1998). The background soil samples were collected from near the property boundary, away from any potential source areas. BSCs were calculated for use at PBOW based on concentrations found in these background soil samples. Each BSC is either the MDC of the concentrations found in these background soil samples or the calculated 95th percent upper tolerance limit of the background data set, whichever value is lower (PBOW Project Delivery Team, 2000). The upper tolerance limit is the concentration, with a probability of 0.95 (or a confidence of 95 percent), that would cover 95 percent of background population if a larger number of samples were collected. Chemicals with MDCs less than their respective BSCs are consistent with background concentrations and are eliminated from further consideration. Use of this method for the development of BSCs and as part of the COPEC screening process ensures consistency between all of the PBOW Formerly Used Defense Sites project sites.

If the MDC of a chemical exceeds the BSC, the chemical is retained as a COPEC, or a more detailed statistical analysis may be performed to determine if the background data and the site data are drawn from the same population. The Wilcoxon Rank Sum test can be used for this purpose; however, the Wilcoxon Rank Sum test was not used in the Coal Yard No. 3 SLERA because no metals required the additional background analysis that it provides.

Chemicals that fail the background evaluation are assumed to be site-related and are not eliminated at this point of the screening process.

2.2.3.4 Essential Nutrients

Evaluating essential nutrients is a special form of risk-based screening applied to certain ubiquitous elements that are generally considered to be required nutrients. Essential nutrients such as calcium, iron, magnesium, potassium, and sodium are usually eliminated as COPECs because they are generally considered to be innocuous in environmental media. Other essential nutrients, including chloride, iodine, and phosphorus, may be eliminated as COPECs, provided that their presence in a particular medium is shown to be unlikely to cause adverse effects to biological health.

2.2.4 Summary of COPEC Selection

The results of the COPEC screening for soil are presented in Table 2-2. The table presents the following information:

- Chemical name
- Frequency of detection
- Range of detected concentrations
- Range of detection limits
- Arithmetic mean (average) of site concentrations
- Distribution type
- Appropriate ESV
- BSC
- COPEC selection conclusion: NO (with rationale for exclusion) or YES (selected).

Using the criteria described previously for identifying COPECs, no chemicals in soil were identified as COPECs requiring further evaluation. Ninety-five percent UCLs are also typically presented for COPECs, but this step was not performed due to the lack of COPECs. Footnotes in Table 2-2 provide the rationale for selecting or rejecting a chemical as a COPEC. As discussed previously, the SLERA null hypotheses state that the potential for adverse ecological effects is considered to be minimal or nonexistent if the site lacks viable habitat, potential ecological receptors, potential exposure pathways, and/or potential chemical stressors. Because no COPECs

(chemical stressors) are present at Coal Yard No. 3, a predictive assessment is not triggered, and no further action for the protection of ecological receptors is considered necessary.

3.0 Risk Summary and Conclusions

Chemicals detected in soil were screened against conservative benchmark values and other criteria to identify COPECs at Coal Yard No. 3. Because of the small size of the site, the site is not spatially relevant to any significant degree for most ecological receptors. However, it is important to note that the site-specific SLERA was performed to satisfy administrative requirements, including FUDS regulations (USACE, 2004).

Following the initial screening step, no chemicals in soil at Coal Yard No. 3 were identified as COPECs requiring additional investigation. Therefore, no further evaluation is considered necessary for the purposes of environmental protection, and the potential for ecological hazard associated with exposure to soil is considered negligible.

4.0 References

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TABLES

Table 2-1

Summary of Soil Samples Evaluated in the Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Sample Location	Sample Number	Sample Purpose	Sample Date	Depth of Sample (ft bgs)	Analysis
Surface Soil					
CY3-SB01	CY0031	REG	12/19/2011	0.2 - 1.2	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB01	CY0032	REG	12/19/2011	3 - 5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB01	CY0033	FD	12/19/2011	3 - 5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB02	CY0036	REG	12/19/2011	1.5 - 2.5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB02	CY0037	REG	12/19/2011	3 - 5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB03	CY0039	REG	12/19/2011	0 - 1	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB03	CY0040	REG	12/19/2011	3 - 5	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB04	CY0042	REG	12/19/2011	0 - 1	Explosives, Gen Chem, Metals, PCB, SVOC
CY3-SB04	CY0043	REG	12/19/2011	3 - 5	Explosives, Gen Chem, Metals, PCB, SVOC

ft bgs - Feet below ground surface.
FD - Field duplicate; averaged with regular sample.
Gen Chem - General chemistry.
PCB - Polychlorinated biphenyls.
REG - Regular sample.
SVOC - Semivolatile organic compounds.

Table 2-2

Statistical Summary and COPEC Selection of Chemicals Detected in Soil (0 to 6 Feet Below Ground Surface)
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	Detection Frequency	Percent Detection	Range of Values (mg/kg) Detected Concentrations Minimum	VQ	Maximum	VQ	Method Detection Limit Minimum	Maximum	Mean (mg/kg)	BSC [a] (mg/kg)	ESV [b] (mg/kg)	COPEC? [c,d]
Inorganics												
Aluminum	8 / 8	100	4.13E+03		1.14E+04		7.30E-01	5.50E+00	7.12E+03	1.55E+04	pH Dependent	N (b)
Arsenic	8 / 8	100	3.60E+00		1.08E+01		3.70E-02	2.75E-01	6.79E+00	3.65E+01	18	N (a)
Barium	8 / 8	100	1.93E+01		6.75E+01		3.70E-02	2.75E-01	4.84E+01	8.26E+02	330	N (a)
Beryllium	8 / 8	100	1.90E-01	J	6.55E-01	J	3.70E-03	2.75E-02	3.97E-01	1.00E+00	21	N (a)
Cadmium	4 / 8	50	1.40E-01	J	2.60E-01	J	5.60E-03	2.75E-02	1.01E-01	NA	0.36	N (a)
Calcium	8 / 8	100	2.34E+03		6.80E+04		2.80E+00	1.40E+01	2.12E+04	5.23E+04	Nutrient	N (c)
Chromium	8 / 8	100	6.70E+00		1.64E+01		5.60E-02	2.75E-01	1.07E+01	2.90E+01	26	N (a)
Cobalt	8 / 8	100	2.70E+00		8.50E+00	J	3.70E-02	2.75E-01	5.86E+00	1.16E+02	13	N (a)
Copper	8 / 8	100	7.40E+00		1.64E+01		3.70E-02	2.75E-01	1.30E+01	5.62E+01	28	N (a)
Iron	8 / 8	100	6.48E+03		2.23E+04		1.20E+00	9.55E+00	1.31E+04	2.34E+05	pH Dependent	N (b)
Lead	8 / 8	100	5.80E+00		1.10E+01		4.40E-02	2.00E-01	9.24E+00	4.86E+01	11	N (b)
Magnesium	8 / 8	100	1.45E+03	J	1.09E+04		1.80E+00	1.40E+01	4.80E+03	1.04E+04	Nutrient	N (c)
Manganese	8 / 8	100	1.58E+02	J	4.36E+02		3.70E-02	2.75E-01	2.90E+02	3.51E+03	220	N (b)
Mercury	8 / 8	100	1.80E-02	J	5.00E-02	J	6.50E-03	7.20E-03	3.11E-02	8.50E-02	0.00051	N (b)
Nickel	8 / 8	100	5.80E+00		2.18E+01		3.70E-02	2.75E-01	1.50E+01	5.51E+01	38	N (a)
Potassium	8 / 8	100	2.73E+02	J	9.21E+02		1.80E+00	1.40E+01	5.59E+02	3.39E+03	Nutrient	N (c)
Sodium	3 / 8	38	5.70E+01	J	9.21E+01	J	2.70E+01	2.05E+02	8.65E+01	NA	Nutrient	N (c)
Vanadium	8 / 8	100	1.06E+01		3.04E+01		3.70E-02	2.75E-01	1.80E+01	4.09E+01	7.8	N (b)
Zinc	8 / 8	100	1.46E+01		4.89E+01		5.60E-02	2.75E-01	3.45E+01	3.22E+02	46	N (b)
Semivolatile Organic Compounds												
Acenaphthylene	2 / 8	25	6.19E-02	J	6.57E-02	J	1.90E-02	2.10E-02	3.11E-02		29	N (a)
Anthracene	2 / 8	25	7.38E-02	J	1.71E-01	J	1.90E-02	2.10E-02	4.57E-02		29	N (a)
Benzo(a)anthracene	3 / 8	38	3.66E-02	J	4.07E-01		1.90E-02	2.10E-02	1.12E-01		1.1	N (a)
Benzo(a)pyrene	3 / 8	38	3.20E-02	J	4.03E-01		1.90E-02	2.10E-02	1.08E-01		1.1	N (a)
Benzo(b)fluoranthene	3 / 8	38	2.91E-02	J	5.82E-01		1.90E-02	2.10E-02	1.41E-01		1.1	N (a)
Benzo(ghi)perylene	3 / 8	38	2.24E-02	J	2.77E-01		1.90E-02	2.10E-02	7.54E-02		1.1	N (a)
Benzo(k)fluoranthene	3 / 8	38	2.69E-02	J	1.88E-01	J	1.90E-02	2.10E-02	5.99E-02		1.1	N (a)
Chrysene	3 / 8	38	4.06E-02	J	4.43E-01		1.90E-02	2.10E-02	1.21E-01		1.1	N (a)
Dibenz(a,h)anthracene	2 / 8	25	4.16E-02	J	5.89E-02	J	1.90E-02	2.10E-02	2.77E-02		1.1	N (a)
Fluoranthene	3 / 8	38	5.25E-02	J	8.43E-01		1.90E-02	2.10E-02	2.07E-01		1.1	N (a)
Indeno(1,2,3-cd)pyrene	3 / 8	38	2.55E-02	J	2.94E-01		1.90E-02	2.10E-02	8.04E-02		1.1	N (a)
Methylnaphthalene, 2-	1 / 8	13	2.10E-02	J	2.10E-02	J	1.90E-02	2.10E-02	2.01E-02		3.24	N (a)
Phenanthrene	3 / 8	38	2.78E-02	J	4.15E-01		1.90E-02	2.10E-02	9.91E-02		29	N (a)
Pyrene	3 / 8	38	4.38E-02	J	6.36E-01		1.90E-02	2.10E-02	1.61E-01		1.1	N (a)

Table 2-2

Statistical Summary and COPEC Selection of Chemicals Detected in Soil (0 to 6 Feet Below Ground Surface)
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

BSC - Background screening concentration.
COPEC - Chemical of potential ecological concern.
ESV - Ecological screening value.
J - The compound/analyte was positively identified; the reported result is the estimated concentration of the compound/analyte detected in the sample analyzed.
mg/kg - Milligrams per kilogram.
UCL - Upper confidence limit.
VQ - Validation qualifier.

[a] IT Corporation (IT), 1998, *Site Investigation of Acid Areas* , *Plum Brook Ordnance Works, Sandusky, Ohio,* August.
[b] ESVs and their sources are in Appendix B.
[c] N = Chemical is not chosen as a COPEC:
(a) = maximum detected concentration is less than the ESV.
(b) = maximum detected concentration is less than the BSC.
(c) = essential nutrient.
[d] Y = Chemical is chosen as COPEC.

FIGURES

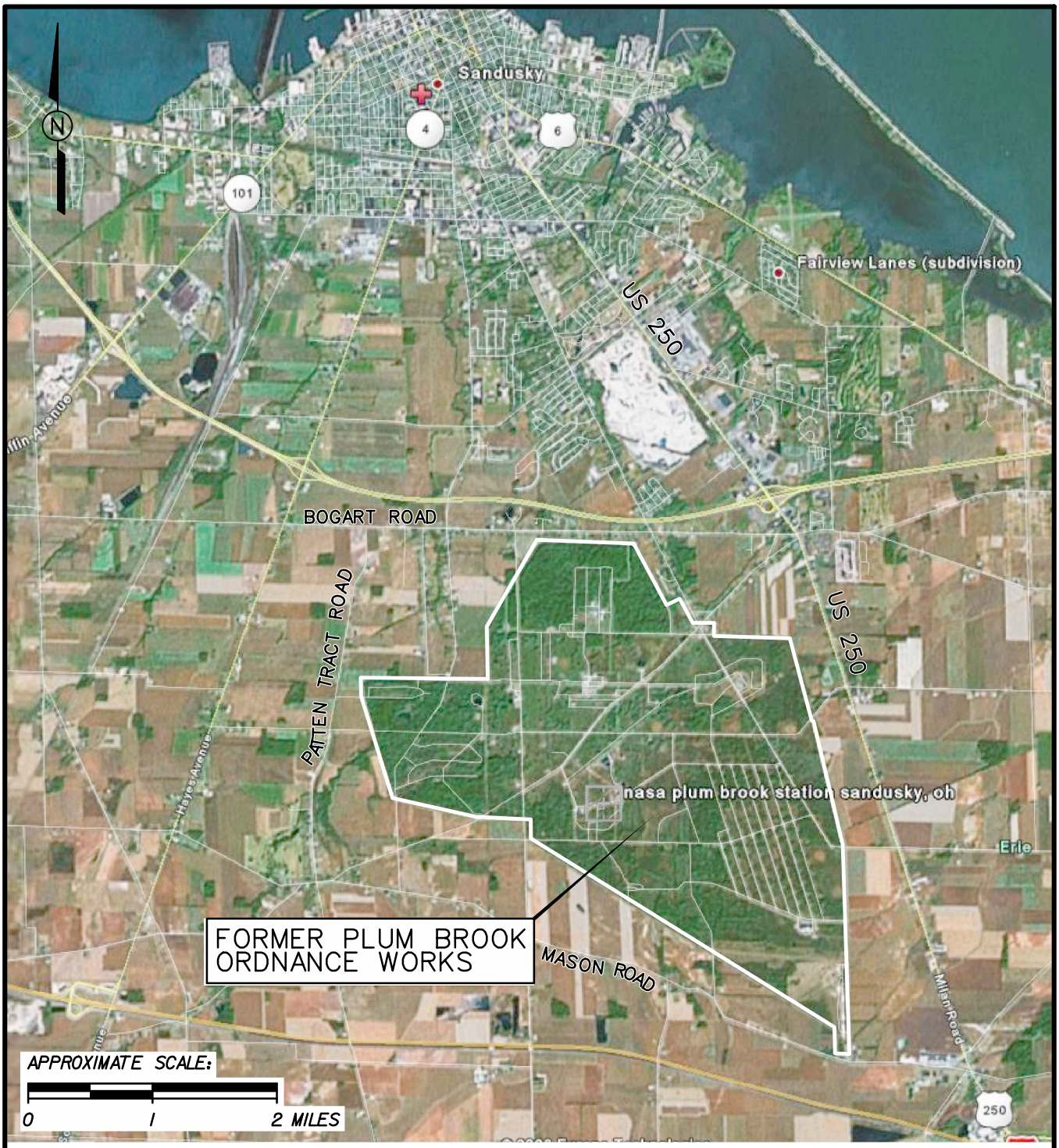

FIGURE 1-1
PBOW VICINITY MAP

ASH PIT No. 3 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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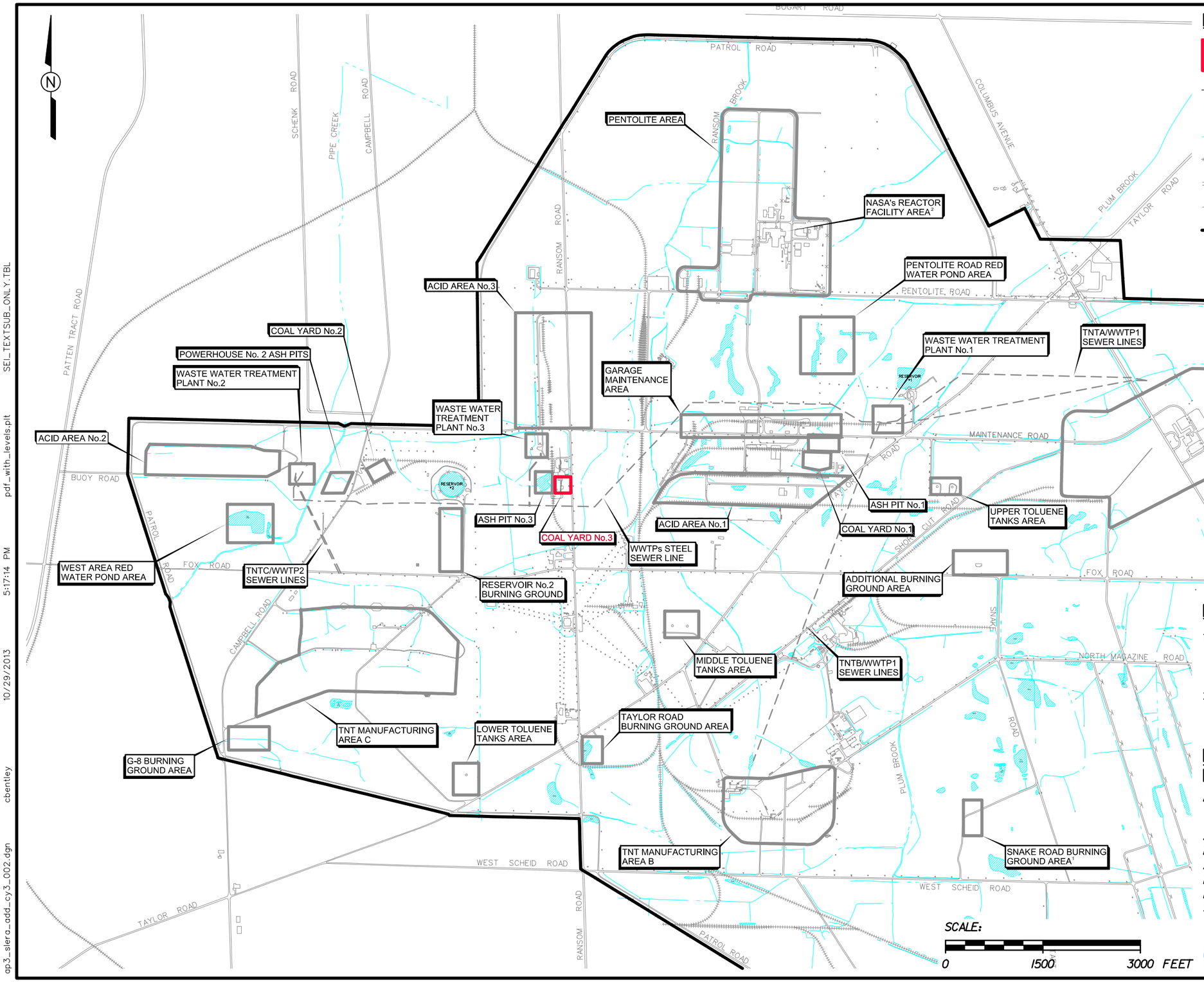

LEGEND:

- COAL YARD
- APPROXIMATE LOCATION OF SEWER LINES
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- FENCE
- FACILITY BOUNDARY

NOTES:

1. SNAKE ROAD BURNING GROUND AREA WAS ALSO REFERRED TO AS "SNAKE ROAD BURN PIT", "SCHEID ROAD BURNING GROUNDS", AND "DISPOSAL AREA THREE".
2. REACTOR FACILITY CONSTRUCTED BY NASA POST WWII AND IS IDENTIFIED FOR LOCATION PURPOSES ONLY.

FIGURE 1-2
LOCATION OF COAL YARD No. 3 AT PBOW

ASH PIT No. 3 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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Figure 2-1

Photo Log of Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Photo 1. Grassy habitat at Coal Yard No. 3.

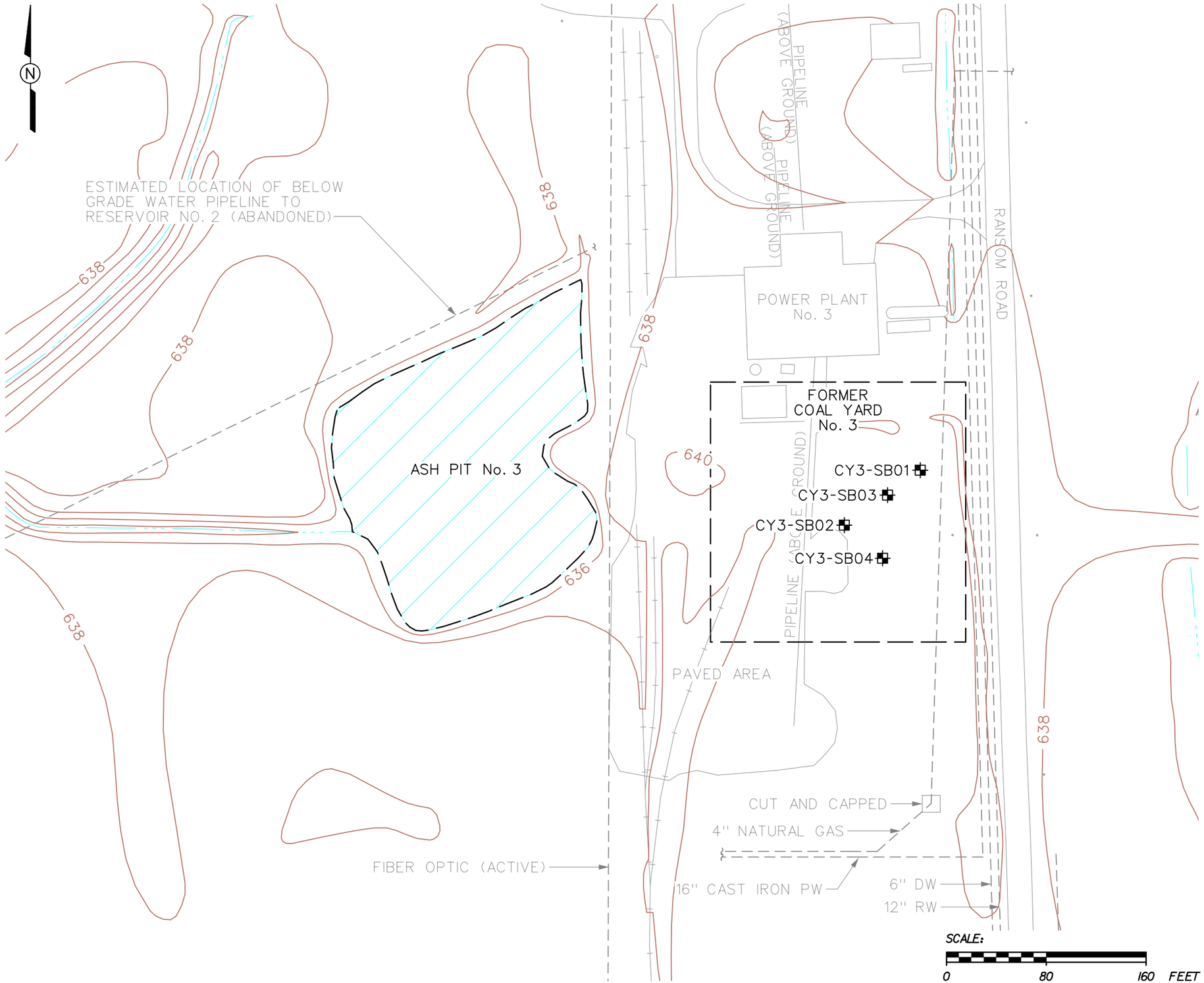
Photo 2. Mowed grass and swale adjacent to Ransom Road at Coal Yard No. 3.

Figure 2-1

Photo Log of Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

Photo 3. Herbaceous vegetation with Powerhouse No. 3 in the background at Coal Yard No. 3.

Photo 4. Herbaceous vegetation at Coal Yard No. 3.



LEGEND:

- SOIL BORING
- POND
- CREEK, DITCH, CONVEYANCE
- FORMER RAILROAD
- ROAD
- UNDERGROUND UTILITIES (APPROXIMATE)
- 640 TOPOGRAPHIC CONTOUR (2 FT. INTERVAL)

NOTES:

1. FORMER COAL YARD NO. 3 PERIMETER IS BASED ON HISTORICAL AERIAL PHOTOGRAPHY AND IS APPROXIMATE.

FIGURE 2-2
SAMPLE LOCATIONS AT COAL YARD No. 3

ASH PIT No. 3 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT ADDENDUM FOR COAL YARD No. 3 FORMER PLUM BROOK ORDNANCE WORKS NASA PLUM BROOK STATION SANDUSKY, OHIO

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)

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APPENDIX A

DATA USED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB01					CY3-SB01				
SAMPLE_NO		CY0031					CY0032					CY0033				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		0.2 - 1.2 Ft					3 - 5 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					FD				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Dinitrobenzene, 1,3-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Dinitrotoluene, 2,4-	mg/kg	0.14	0.14	0.068	U	U	0.18	0.18	0.086	U	U	0.16	0.16	0.08	U	U
Dinitrotoluene, 2,6-	mg/kg	0.14	0.14	0.061	U	U	0.18	0.18	0.077	U	U	0.16	0.16	0.072	U	U
HMX	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Nitrobenzene	mg/kg	0.14	0.14	0.065	U	U	0.18	0.18	0.082	U	U	0.16	0.16	0.077	U	U
Nitrotoluene, 2-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Nitrotoluene, 3-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Nitrotoluene, 4-	mg/kg	0.14	0.14	0.071	U	U	0.18	0.18	0.089	U	U	0.16	0.16	0.083	U	U
RDX	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Tetryl	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.14	0.14	0.056	U	U	0.18	0.18	0.071	U	U	0.16	0.16	0.066	U	U
General Chemistry																
% Solids	Percent	85.1	0				81	0				80.1	0			
Total organic carbon	Percent	0.66	0.2	0.2												
Metals																
Aluminum	mg/kg	7110	18	1.8			11400	48	4.8			11400	62	6.2		
Antimony	mg/kg	1.8	1.8	0.088	U	U	4.8	4.8	0.24	U	U	6.2	6.2	0.31	U	U
Arsenic	mg/kg	8.8	0.88	0.088			8.7	2.4	0.24			12.9	3.1	0.31		
Barium	mg/kg	44.7	18	0.088			64.3	48	0.24			70.7	62	0.31		
Beryllium	mg/kg	0.42	0.44	0.0088	B	J	0.7	1.2	0.024	B	J	0.61	1.6	0.031	B	J
Cadmium	mg/kg	0.16	0.35	0.0088	B	J	0.96	0.96	0.024	U	U	1.2	1.2	0.031	U	U
Calcium	mg/kg	20200	440	4.4			2740	1200	12			3260	1600	16		
Chromium	mg/kg	9.6	0.88	0.088			15.6	2.4	0.24			17.2	3.1	0.31		
Cobalt	mg/kg	8.1	4.4	0.088			8.6	12	0.24	B	J	8.4	16	0.31	B	J
Copper	mg/kg	15.2	2.2	0.088			13.2	6	0.24			19.5	7.8	0.31		
Iron	mg/kg	14500	27	3			18700	72	8.1			25800	94	11		
Lead	mg/kg	11	0.88	0.044			8.6	0.96	0.048			9.7	1.2	0.062		
Magnesium	mg/kg	5920	440	4.4			2250	1200	12			1970	1600	16		
Manganese	mg/kg	316	1.3	0.088			426	3.6	0.24			291	4.7	0.31		
Mercury	mg/kg	0.029	0.093	0.0066	B	J	0.021	0.1	0.0073	B	J	0.049	0.1	0.0071	B	J
Nickel	mg/kg	19.8	3.5	0.088			19.6	9.6	0.24			23.9	12	0.31		
Potassium	mg/kg	755	880	4.4	B	J	697	2400	12	B	J	598	3100	16	B	J
Selenium	mg/kg	1.8	1.8	0.18	U	U	4.8	4.8	0.48	U	U	6.2	6.2	0.62	U	U
Silver	mg/kg	0.88	0.88	0.088	U	U	2.4	2.4	0.24	U	U	3.1	3.1	0.31	U	U
Sodium	mg/kg	880	880	66	U	U	2400	2400	180	U	U	3100	3100	230	U	U
Thallium	mg/kg	0.44	0.44	0.044	U	U	0.48	0.48	0.048	U	U	0.62	0.62	0.062	U	U
Vanadium	mg/kg	16.2	4.4	0.088			27.3	12	0.24			33.4	16	0.31		
Zinc	mg/kg	48.9	1.8	0.088			38.5	4.8	0.24			50.4	6.2	0.31		
PCBs																
Aroclor 1016	mg/kg	0.02	0.02	0.0078	U	U	0.02	0.02	0.0081	U	U	0.02	0.02	0.0082	U	U
Aroclor 1221	mg/kg	0.02	0.02	0.0098	U	U	0.02	0.02	0.01	U	U	0.02	0.02	0.01	U	U
Aroclor 1232	mg/kg	0.02	0.02	0.0098	U	U	0.02	0.02	0.01	U	U	0.02	0.02	0.01	U	U
Aroclor 1242	mg/kg	0.02	0.02	0.0078	U	U	0.02	0.02	0.0081	U	U	0.02	0.02	0.0082	U	U
Aroclor 1248	mg/kg	0.02	0.02	0.0078	U	U	0.02	0.02	0.0081	U	U	0.02	0.02	0.0082	U	U
Aroclor 1254	mg/kg	0.02	0.02	0.0078	U	U	0.02	0.02	0.0081	U	U	0.02	0.02	0.0082	U	U
Aroclor 1260	mg/kg	0.02	0.02	0.0078	U	U	0.02	0.02	0.0081	U	U	0.02	0.02	0.0082	U	U
Semivolatiles																

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB01					CY3-SB01				
SAMPLE_NO		CY0031					CY0032					CY0033				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		0.2 - 1.2 Ft					3 - 5 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					FD				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
3-Methylphenol and 4-Methylphenol	mg/kg	0.19	0.19	0.028	U	U	0.21	0.21	0.03	U	U	0.21	0.21	0.03	U	U
Acenaphthene	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Acenaphthylene	mg/kg	0.0657	0.19	0.019	J	J	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Anthracene	mg/kg	0.171	0.19	0.019	J	J	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzo(a)anthracene	mg/kg	0.407	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzo(a)pyrene	mg/kg	0.326	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzo(b)fluoranthene	mg/kg	0.414	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzo(ghi)perylene	mg/kg	0.203	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzo(k)fluoranthene	mg/kg	0.163	0.19	0.019	J	J	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Benzoic acid	mg/kg	0.97	0.97	0.34	U	U	1	1	0.36	U	U	1	1	0.36	U	U
Benzyl alcohol	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Bis(2-chloroethyl)ether	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.39	0.39	0.078	U	U	0.41	0.41	0.083	U	U	0.41	0.41	0.082	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Butyl benzyl phthalate	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Carbazole	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Chloroaniline, 4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Chloronaphthalene, 2-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Chlorophenol, 2-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Chrysene	mg/kg	0.387	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Dibenz(a,h)anthracene	mg/kg	0.0416	0.19	0.019	J	J	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Dibenzofuran	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Dichlorobenzene, 1,2-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Dichlorobenzene, 1,3-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Dichlorobenzene, 1,4-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.39	0.39	0.039	U	U	0.41	0.41	0.041	U	U	0.41	0.41	0.041	U	U
Dichlorophenol, 2,4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Diethyl phthalate	mg/kg	0.39	0.39	0.078	U	U	0.41	0.41	0.083	U	U	0.41	0.41	0.082	U	U
Dimethyl phthalate	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Dimethylphenol, 2,4-	mg/kg	0.19	0.19	0.025	U	U	0.21	0.21	0.026	U	U	0.21	0.21	0.026	U	U
Di-n-butyl phthalate	mg/kg	0.39	0.39	0.078	U	U	0.41	0.41	0.083	U	U	0.41	0.41	0.082	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.39	0.39	0.078	U	U	0.41	0.41	0.083	U	U	0.41	0.41	0.082	U	U
Dinitrophenol, 2,4-	mg/kg	0.97	0.97	0.39	U	U	1	1	0.41	U	U	1	1	0.41	U	U
Dinitrotoluene, 2,4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Dinitrotoluene, 2,6-	mg/kg	0.19	0.19	0.023	U	U	0.21	0.21	0.024	U	U	0.21	0.21	0.024	U	U
Di-n-octyl phthalate	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Fluoranthene	mg/kg	0.843	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Fluorene	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Hexachlorobenzene	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Hexachlorobutadiene	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Hexachlorocyclopentadiene	mg/kg	0.19	0.19	0.086	U	U	0.21	0.21	0.091	U	U	0.21	0.21	0.091	U	U
Hexachloroethane	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.223	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Isophorone	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Methylnaphthalene, 2-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Methylphenol, 2-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Naphthalene	mg/kg	0.19	0.19	0.031	U	U	0.21	0.21	0.033	U	U	0.21	0.21	0.033	U	U

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB01					CY3-SB01					CY3-SB01				
SAMPLE_NO		CY0031					CY0032					CY0033				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		0.2 - 1.2 Ft					3 - 5 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					FD				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Nitroaniline, 2-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Nitroaniline, 3-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Nitroaniline, 4-	mg/kg	0.19	0.19	0.039	U	U	0.21	0.21	0.041	U	U	0.21	0.21	0.041	U	U
Nitrobenzene	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Nitrophenol, 2-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Nitrophenol, 4-	mg/kg	0.97	0.97	0.16	U	U	1	1	0.17	U	U	1	1	0.16	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
n-Nitrosodiphenylamine	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Pentachlorophenol	mg/kg	0.97	0.97	0.23	U	U	1	1	0.25	U	U	1	1	0.25	U	U
Phenanthrene	mg/kg	0.415	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Phenol	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Pyrene	mg/kg	0.636	0.19	0.019			0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.19	0.19	0.019	U	U	0.21	0.21	0.021	U	U	0.21	0.21	0.021	U	U

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB02					CY3-SB02					CY3-SB03				
SAMPLE_NO		CY0036					CY0037					CY0039				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		1.5 - 2.5 Ft					3 - 5 Ft					0 - 1 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Dinitrobenzene, 1,3-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Dinitrotoluene, 2,4-	mg/kg	0.15	0.15	0.075	U	U	0.18	0.18	0.086	U	U	0.18	0.18	0.087	U	U
Dinitrotoluene, 2,6-	mg/kg	0.15	0.15	0.067	U	U	0.18	0.18	0.077	U	U	0.18	0.18	0.078	U	U
HMX	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Nitrobenzene	mg/kg	0.15	0.15	0.072	U	U	0.18	0.18	0.082	U	U	0.18	0.18	0.084	U	U
Nitrotoluene, 2-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Nitrotoluene, 3-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Nitrotoluene, 4-	mg/kg	0.15	0.15	0.078	U	U	0.18	0.18	0.089	U	U	0.18	0.18	0.091	U	U
RDX	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Tetryl	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.15	0.15	0.062	U	U	0.18	0.18	0.071	U	U	0.18	0.18	0.072	U	U
General Chemistry																
% Solids	Percent	83	0				81.7	0				84.8	0			
Total organic carbon	Percent															
Metals																
Aluminum	mg/kg	4130	7.9	0.79			8230	19	1.9			5780	9.6	0.96		
Antimony	mg/kg	3.9	3.9	0.2	U	U	1.9	1.9	0.094	U	U	1.9	1.9	0.096	U	U
Arsenic	mg/kg	3.6	0.39	0.039			7.5	0.94	0.094			7.2	0.48	0.048		
Barium	mg/kg	19.3	7.9	0.039			58.2	19	0.094			37.4	9.6	0.048		
Beryllium	mg/kg	0.19	0.2	0.0039	B	J	0.49	0.47	0.0094			0.3	0.24	0.0048		
Cadmium	mg/kg	0.79	0.79	0.02	U	U	0.38	0.38	0.0094	U	U	0.18	0.38	0.0096	B	J
Calcium	mg/kg	68000	980	9.8			2340	470	4.7			38500	480	4.8		
Chromium	mg/kg	6.7	2	0.2			12.1	0.94	0.094			10.3	0.96	0.096		
Cobalt	mg/kg	2.7	2	0.039			5.9	4.7	0.094			6.7	2.4	0.048		
Copper	mg/kg	7.4	0.98	0.039			12.2	2.4	0.094			14.7	1.2	0.048		
Iron	mg/kg	6480	12	1.3			15000	28	3.2			12100	14	1.6		
Lead	mg/kg	5.8	3.9	0.2			9.3	0.94	0.047			10	1.9	0.096		
Magnesium	mg/kg	5020	200	2			1600	470	4.7			10900	240	2.4		
Manganese	mg/kg	240	0.59	0.039			251	1.4	0.094			325	0.72	0.048		
Mercury	mg/kg	0.03	0.1	0.0071	B	J	0.033	0.1	0.0071	B	J	0.018	0.095	0.0068	B	J
Nickel	mg/kg	5.8	1.6	0.039			15.6	3.8	0.094			17.5	1.9	0.048		
Potassium	mg/kg	273	390	2	B	J	478	940	4.7	B	J	921	480	2.4		
Selenium	mg/kg	3.9	3.9	0.39	U	U	1.9	1.9	0.19	U	U	1.9	1.9	0.19	U	U
Silver	mg/kg	0.39	0.39	0.039	U	U	0.94	0.94	0.094	U	U	0.48	0.48	0.048	U	U
Sodium	mg/kg	57	390	30	B	J	940	940	71	U	U	92.1	480	36	B	J
Thallium	mg/kg	2	2	0.2	U	U	0.47	0.47	0.047	U	U	0.96	0.96	0.096	U	U
Vanadium	mg/kg	10.7	2	0.039			23.7	4.7	0.094			13.5	2.4	0.048		
Zinc	mg/kg	14.6	3.9	0.2			30.9	1.9	0.094			38.7	1.9	0.096		
PCBs																
Aroclor 1016	mg/kg	0.02	0.02	0.0079	U	U	0.02	0.02	0.0081	U	U	0.019	0.019	0.0077	U	U
Aroclor 1221	mg/kg	0.02	0.02	0.0099	U	U	0.02	0.02	0.01	U	U	0.019	0.019	0.0097	U	U
Aroclor 1232	mg/kg	0.02	0.02	0.0099	U	U	0.02	0.02	0.01	U	U	0.019	0.019	0.0097	U	U
Aroclor 1242	mg/kg	0.02	0.02	0.0079	U	U	0.02	0.02	0.0081	U	U	0.019	0.019	0.0077	U	U
Aroclor 1248	mg/kg	0.02	0.02	0.0079	U	U	0.02	0.02	0.0081	U	U	0.019	0.019	0.0077	U	U
Aroclor 1254	mg/kg	0.02	0.02	0.0079	U	U	0.02	0.02	0.0081	U	U	0.019	0.019	0.0077	U	U
Aroclor 1260	mg/kg	0.02	0.02	0.0079	U	U	0.02	0.02	0.0081	U	U	0.019	0.019	0.0077	U	U
Semivolatiles																

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB02					CY3-SB02					CY3-SB03				
SAMPLE_NO		CY0036					CY0037					CY0039				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		1.5 - 2.5 Ft					3 - 5 Ft					0 - 1 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	0.2	0.029	U	U	0.2	0.2	0.029	U	U	0.2	0.2	0.028	U	U
Acenaphthene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Acenaphthylene	mg/kg	0.0619	0.2	0.02	J	J	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Anthracene	mg/kg	0.0738	0.2	0.02	J	J	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(a)anthracene	mg/kg	0.348	0.2	0.02			0.2	0.2	0.02	U	U	0.0366	0.2	0.02	J	J
Benzo(a)pyrene	mg/kg	0.403	0.2	0.02			0.2	0.2	0.02	U	U	0.032	0.2	0.02	J	J
Benzo(b)fluoranthene	mg/kg	0.582	0.2	0.02			0.2	0.2	0.02	U	U	0.0291	0.2	0.02	J	J
Benzo(ghi)perylene	mg/kg	0.277	0.2	0.02			0.2	0.2	0.02	U	U	0.0224	0.2	0.02	J	J
Benzo(k)fluoranthene	mg/kg	0.188	0.2	0.02	J	J	0.2	0.2	0.02	U	U	0.0269	0.2	0.02	J	J
Benzoic acid	mg/kg	1	1	0.35	U	U	1	1	0.35	U	U	0.98	0.98	0.34	U	U
Benzyl alcohol	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	0.4	0.08	U	U	0.4	0.4	0.081	U	U	0.39	0.39	0.078	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Butyl benzyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Carbazole	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloroaniline, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloronaphthalene, 2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Chlorophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chrysene	mg/kg	0.443	0.2	0.02			0.2	0.2	0.02	U	U	0.0406	0.2	0.02	J	J
Dibenz(a,h)anthracene	mg/kg	0.0589	0.2	0.02	J	J	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dibenzofuran	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.4	0.4	0.04	U	U	0.4	0.4	0.04	U	U	0.39	0.39	0.039	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Diethyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.4	0.4	0.081	U	U	0.39	0.39	0.078	U	U
Dimethyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	0.2	0.025	U	U	0.2	0.2	0.025	U	U	0.2	0.2	0.025	U	U
Di-n-butyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.4	0.4	0.081	U	U	0.39	0.39	0.078	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	0.4	0.08	U	U	0.4	0.4	0.081	U	U	0.39	0.39	0.078	U	U
Dinitrophenol, 2,4-	mg/kg	1	1	0.4	U	U	1	1	0.4	U	U	0.98	0.98	0.39	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	0.2	0.024	U	U	0.2	0.2	0.024	U	U	0.2	0.2	0.023	U	U
Di-n-octyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Fluoranthene	mg/kg	0.662	0.2	0.02			0.2	0.2	0.02	U	U	0.0525	0.2	0.02	J	J
Fluorene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Hexachlorobenzene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Hexachlorobutadiene	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	0.2	0.088	U	U	0.2	0.2	0.089	U	U	0.2	0.2	0.086	U	U
Hexachloroethane	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.294	0.2	0.02			0.2	0.2	0.02	U	U	0.0255	0.2	0.02	J	J
Isophorone	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Methylnaphthalene, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.021	0.2	0.02	J	J
Methylphenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Naphthalene	mg/kg	0.2	0.2	0.032	U	U	0.2	0.2	0.032	U	U	0.2	0.2	0.031	U	U

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB02					CY3-SB02					CY3-SB03				
SAMPLE_NO		CY0036					CY0037					CY0039				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		1.5 - 2.5 Ft					3 - 5 Ft					0 - 1 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Nitroaniline, 2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Nitroaniline, 3-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Nitroaniline, 4-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U
Nitrobenzene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 4-	mg/kg	1	1	0.16	U	U	1	1	0.16	U	U	0.98	0.98	0.16	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Pentachlorophenol	mg/kg	1	1	0.24	U	U	1	1	0.24	U	U	0.98	0.98	0.23	U	U
Phenanthrene	mg/kg	0.249	0.2	0.02			0.2	0.2	0.02	U	U	0.0278	0.2	0.02	J	J
Phenol	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Pyrene	mg/kg	0.508	0.2	0.02			0.2	0.2	0.02	U	U	0.0438	0.2	0.02	J	J
Trichlorobenzene, 1,2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB03					CY3-SB04					CY3-SB04				
SAMPLE_NO		CY0040					CY0042					CY0043				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		3 - 5 Ft					0 - 1 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Explosives																
Amino-2,6-dinitrotoluene, 4-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Amino-4,6-dinitrotoluene, 2-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Dinitrobenzene, 1,3-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Dinitrotoluene, 2,4-	mg/kg	0.17	0.17	0.083	U	U	0.15	0.15	0.075	U	U	0.16	0.16	0.079	U	U
Dinitrotoluene, 2,6-	mg/kg	0.17	0.17	0.075	U	U	0.15	0.15	0.067	U	U	0.16	0.16	0.07	U	U
HMX	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrobenzene	mg/kg	0.17	0.17	0.08	U	U	0.15	0.15	0.072	U	U	0.16	0.16	0.075	U	U
Nitrotoluene, 2-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrotoluene, 3-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Nitrotoluene, 4-	mg/kg	0.17	0.17	0.087	U	U	0.15	0.15	0.078	U	U	0.16	0.16	0.082	U	U
RDX	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Tetryl	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Trinitrobenzene, 1,3,5-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
Trinitrotoluene, 2,4,6-	mg/kg	0.17	0.17	0.069	U	U	0.15	0.15	0.062	U	U	0.16	0.16	0.065	U	U
General Chemistry																
% Solids	Percent	83.2	0				85.4	0				80.7	0			
Total organic carbon	Percent															
Metals																
Aluminum	mg/kg	7270	11	1.1		J	4640	7.3	0.73			8390	24	2.4		
Antimony	mg/kg	1.1	1.1	0.056	U	UJ	1.5	1.5	0.073	U	U	2.4	2.4	0.12	U	U
Arsenic	mg/kg	3.7	0.56	0.056		J	4.9	0.37	0.037			7.8	1.2	0.12		
Barium	mg/kg	51	11	0.056		J	42.4	7.3	0.037			66.3	24	0.12		
Beryllium	mg/kg	0.38	0.28	0.0056		J	0.25	0.18	0.0037			0.49	0.59	0.012	B	J
Cadmium	mg/kg	0.26	0.22	0.0056		J	0.14	0.29	0.0073	B	J	0.47	0.47	0.012	U	U
Calcium	mg/kg	2850	280	2.8		J	31800	370	3.7			2860	590	5.9		
Chromium	mg/kg	9.1	0.56	0.056		J	8.6	0.73	0.073			12.6	1.2	0.12		
Cobalt	mg/kg	3.6	2.8	0.056		J	4.7	1.8	0.037			6.7	5.9	0.12		
Copper	mg/kg	10.5	1.4	0.056		J	12	0.91	0.037			15.7	3	0.12		
Iron	mg/kg	9520	17	1.9		J	8830	11	1.2			16400	35	4		
Lead	mg/kg	9.4	1.1	0.056		J	9.9	1.5	0.073			9.4	1.2	0.059		
Magnesium	mg/kg	1450	280	2.8		J	9390	180	1.8			1990	590	5.9		
Manganese	mg/kg	158	0.83	0.056		J	236	0.55	0.037			436	1.8	0.12		
Mercury	mg/kg	0.05	0.091	0.0065	B	J	0.02	0.091	0.0065	B	J	0.034	0.094	0.0067	B	J
Nickel	mg/kg	8.8	2.2	0.056		J	12	1.5	0.037			18.7	4.7	0.12		
Potassium	mg/kg	387	560	2.8	B	J	558	370	1.8			454	1200	5.9	B	J
Selenium	mg/kg	1.1	1.1	0.11	U	UJ	1.5	1.5	0.15	U	U	2.4	2.4	0.24	U	U
Silver	mg/kg	0.56	0.56	0.056	U	UJ	0.37	0.37	0.037	U	U	1.2	1.2	0.12	U	U
Sodium	mg/kg	560	560	42	U	UJ	70	370	27	B	J	1200	1200	89	U	U
Thallium	mg/kg	0.56	0.56	0.056	U	U	0.73	0.73	0.073	U	U	0.59	0.59	0.059	U	U
Vanadium	mg/kg	16.3	2.8	0.056		J	10.6	1.8	0.037			22.4	5.9	0.12		
Zinc	mg/kg	25.9	1.1	0.056		J	33.3	1.5	0.073			39.3	2.4	0.12		
PCBs																
Aroclor 1016	mg/kg	0.02	0.02	0.008	U	U	0.019	0.019	0.0077	U	U	0.021	0.021	0.0082	U	U
Aroclor 1221	mg/kg	0.02	0.02	0.01	U	U	0.019	0.019	0.0096	U	U	0.021	0.021	0.01	U	U
Aroclor 1232	mg/kg	0.02	0.02	0.01	U	U	0.019	0.019	0.0096	U	U	0.021	0.021	0.01	U	U
Aroclor 1242	mg/kg	0.02	0.02	0.008	U	U	0.019	0.019	0.0077	U	U	0.021	0.021	0.0082	U	U
Aroclor 1248	mg/kg	0.02	0.02	0.008	U	U	0.019	0.019	0.0077	U	U	0.021	0.021	0.0082	U	U
Aroclor 1254	mg/kg	0.02	0.02	0.008	U	U	0.019	0.019	0.0077	U	U	0.021	0.021	0.0082	U	U
Aroclor 1260	mg/kg	0.02	0.02	0.008	U	U	0.019	0.019	0.0077	U	U	0.021	0.021	0.0082	U	U
Semivolatiles																

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB03					CY3-SB04					CY3-SB04				
SAMPLE_NO		CY0040					CY0042					CY0043				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		3 - 5 Ft					0 - 1 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	Units	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ	Result	RL	MDL	LQ	VQ
3-Methylphenol and 4-Methylphenol	mg/kg	0.2	0.2	0.029	U	U	0.2	0.2	0.028	U	U	0.2	0.2	0.029	U	U
Acenaphthene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Acenaphthylene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Anthracene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(a)anthracene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(a)pyrene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(b)fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(ghi)perylene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzo(k)fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Benzoic acid	mg/kg	1	1	0.35	U	UJ	0.98	0.98	0.34	U	U	1	1	0.36	U	U
Benzyl alcohol	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Bis(2-chloroethoxy)methane	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroethyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-chloroisopropyl)ether	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Bis(2-ethylhexyl)phthalate	mg/kg	0.4	0.4	0.08	U	U	0.39	0.39	0.078	U	U	0.41	0.41	0.082	U	U
Bromophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Butyl benzyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Carbazole	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloro-3-methylphenol, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloroaniline, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chloronaphthalene, 2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Chlorophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chlorophenyl phenyl ether, 4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Chrysene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dibenz(a,h)anthracene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dibenzofuran	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dichlorobenzene, 1,2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Dichlorobenzene, 1,3-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Dichlorobenzene, 1,4-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Dichlorobenzidine, 3,3'-	mg/kg	0.4	0.4	0.04	U	U	0.39	0.39	0.039	U	U	0.41	0.41	0.041	U	U
Dichlorophenol, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Diethyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.39	0.39	0.078	U	U	0.41	0.41	0.082	U	U
Dimethyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Dimethylphenol, 2,4-	mg/kg	0.2	0.2	0.025	U	U	0.2	0.2	0.025	U	U	0.2	0.2	0.026	U	U
Di-n-butyl phthalate	mg/kg	0.4	0.4	0.08	U	U	0.39	0.39	0.078	U	U	0.41	0.41	0.082	U	U
Dinitro-2-methylphenol, 4,6-	mg/kg	0.4	0.4	0.08	U	U	0.39	0.39	0.078	U	U	0.41	0.41	0.082	U	U
Dinitrophenol, 2,4-	mg/kg	1	1	0.4	U	U	0.98	0.98	0.39	U	U	1	1	0.41	U	U
Dinitrotoluene, 2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Dinitrotoluene, 2,6-	mg/kg	0.2	0.2	0.024	U	U	0.2	0.2	0.023	U	U	0.2	0.2	0.024	U	U
Di-n-octyl phthalate	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Fluoranthene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Fluorene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Hexachlorobenzene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Hexachlorobutadiene	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Hexachlorocyclopentadiene	mg/kg	0.2	0.2	0.088	U	U	0.2	0.2	0.086	U	U	0.2	0.2	0.09	U	U
Hexachloroethane	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Isophorone	mg/kg	0.2	0.2	0.02	U	UJ	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Methylnaphthalene, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Methylphenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Naphthalene	mg/kg	0.2	0.2	0.032	U	U	0.2	0.2	0.031	U	U	0.2	0.2	0.033	U	U

Table A-1

Soil Data Used in the Screening-Level Ecological Risk Assessment
Coal Yard No. 3
Former Plum Brook Ordnance Works, Sandusky, Ohio

LOCATION_CODE		CY3-SB03					CY3-SB04					CY3-SB04				
SAMPLE_NO		CY0040					CY0042					CY0043				
SAMPLE_DATE		12/19/2011					12/19/2011					12/19/2011				
FK_DEPTH		3 - 5 Ft					0 - 1 Ft					3 - 5 Ft				
SAMPLE_PURPOSE		REG					REG					REG				
Parameter	**Units**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**	**Result**	**RL**	**MDL**	**LQ**	**VQ**
Nitroaniline, 2-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Nitroaniline, 3-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Nitroaniline, 4-	mg/kg	0.2	0.2	0.04	U	U	0.2	0.2	0.039	U	U	0.2	0.2	0.041	U	U
Nitrobenzene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 2-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Nitrophenol, 4-	mg/kg	1	1	0.16	U	U	0.98	0.98	0.16	U	U	1	1	0.16	U	U
n-Nitroso-di-n-propylamine	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
n-Nitrosodiphenylamine	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Pentachlorophenol	mg/kg	1	1	0.24	U	U	0.98	0.98	0.23	U	U	1	1	0.24	U	U
Phenanthrene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Phenol	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Pyrene	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Trichlorobenzene, 1,2,4-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,5-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U
Trichlorophenol, 2,4,6-	mg/kg	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U	0.2	0.2	0.02	U	U

FD - Field duplicate
LQ - Laboratory qualifier
MDL - Method detection limit
mg/kg - Milligrams per kilogram
REG - Regular Sample
RL - Reporting limit
VQ - Validation qualifier

APPENDIX B

ECOLOGICAL SCREENING VALUES

Table B-1

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Inorganic Analytes							
Aluminum	7429-90-5	pH Dependent	NSV	NSV	NSV	50	pH Dependent
Antimony	7440-36-0	0.27	5	0.142	NSV	5	0.27
Arsenic	7440-38-2	18	9.9	5.7	60	10	18
Barium	7440-39-3	330	283	1.04	NSV	500	330
Beryllium	7440-41-7	21	10	1.06	NSV	10	21
Cadmium	7440-43-9	0.36	4	0.00222	20	4	0.36
Calcium	7440-70-2	NSV	NSV	NSV	NSV	NSV	Nutrient
Chromium	7440-47-3	26	0.4	0.4	0.4	1	26
Chromium, hexavalent	18540-29-9	81	NSV	NSV	NSV	NSV	81
Cobalt	7440-48-4	13	20	0.14	NSV	20	13
Copper	7440-50-8	28	60	5.4	50	100	28
Iron	7439-89-6	pH Dependent	NSV	NSV	NSV	NSV	pH Dependent
Lead	7439-92-1	11	40.5	0.0537	500	50	11
Magnesium	7439-95-4	NSV	NSV	NSV	NSV	NSV	Nutrient
Manganese	7439-96-5	220	NSV	NSV	NSV	500	220
Mercury	7439-97-6	NSV	0.00051	0.1	0.1	0.3	0.00051
Nickel	7440-02-0	38	30	13.6	200	30	38
Potassium	7440-09-7	NSV	NSV	NSV	NSV	NSV	Nutrient
Selenium	7782-49-2	0.52	0.21	0.0276	70	1	0.52
Silver	7440-22-4	4.2	2	4.04	NSV	2	4.2
Sodium	7440-23-5	NSV	NSV	NSV	NSV	NSV	Nutrient
Thallium	7440-28-0	NSV	1	0.0569	NSV	1	1
Vanadium	7440-62-2	7.8	2	1.59	NSV	2	7.8
Zinc	7440-66-6	46	8.5	6.62	200	50	46
Cyanide							
Cyanide, Total	57-12-5	NSV	NSV	1.33	NSV	NSV	1.33
Polychlorinated Biphenyls							
Aroclor 1016	12674-11-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1221	11104-28-2	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1232	11141-16-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1242	53469-21-9	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1254	11097-69-1	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Aroclor 1260	11096-82-5	NSV	0.371 [f]	0.000332 [f]	NSV	40 [f]	0.371
Organochlorine Pesticides							
4,4'-DDE	72-55-9	0.021 [g]	NSV	0.596	NSV	NSV	0.021
4,4'-DDT	50-29-3	0.021 [g]	NSV	0.0035	NSV	NSV	0.021
Methoxychlor	72-43-5	NSV	NSV	0.0199	NSV	NSV	0.0199

Table B-1

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Nitroaromatics							
Amino-2,6-dinitrotoluene, 4-	19406-51-0	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328
Amino-4,6-dinitrotoluene, 2-	35572-78-2	NSV	NSV	0.0328 [i]	NSV	NSV	0.0328
Dinitrobenzene, 1,3-	99-65-0	NSV	NSV	0.655	NSV	NSV	0.655
Dinitrotoluene, 2,4-	121-14-2	NSV	NSV	1.28	NSV	NSV	1.28
Dinitrotoluene, 2,6-	606-20-2	NSV	NSV	0.0328	NSV	NSV	0.0328
RDX	121-82-4	NSV	NSV	NSV	NSV	NSV	NSV
Tetryl	479-45-8	NSV	NSV	NSV	NSV	NSV	NSV
Trinitrobenzene, 1,3,5-	99-35-4	NSV	NSV	0.376	NSV	NSV	0.376
Trinitrotoluene, 2,4,6-	118-96-7	NSV	NSV	NSV	NSV	NSV	NSV
Semivolatile Organic Compounds							
Acenaphthene	83-32-9	29	20	682	NSV	20	29
Acenaphthylene	208-96-8	29	NSV	682	NSV	NSV	29
Anthracene	120-12-7	29	NSV	1480	NSV	NSV	29
Benzo(a)anthracene	56-55-3	1.1	NSV	5.21	NSV	NSV	1.1
Benzo(a)pyrene	50-32-8	1.1	NSV	1.52	NSV	NSV	1.1
Benzo(b)fluoranthene	205-99-2	1.1	NSV	59.8	NSV	NSV	1.1
Benzo(ghi)perylene	191-24-2	1.1	NSV	119	NSV	NSV	1.1
Benzo(k)fluoranthene	207-08-9	1.1	NSV	148	NSV	NSV	1.1
Benzoic acid	65-85-0	NSV	NSV	NSV	NSV	NSV	NSV
bis(2-Ethylhexyl)phthalate	117-81-7	NSV	NSV	0.925	NSV	NSV	0.925
Carbazole	86-74-8	NSV	NSV	NSV	NSV	NSV	NSV
Chrysene	218-01-9	1.1	NSV	4.73	NSV	NSV	1.1
Dibenz(a,h)anthracene	53-73-3	1.1	NSV	18.4	NSV	NSV	1.1
Dibenzofuran	132-64-9	NSV	NSV	NSV	NSV	NSV	NSV
Di-n-butyl phthalate	84-74-2	NSV	200	0.15	NSV	200	200
Fluoranthene	206-44-0	1.1	NSV	122	NSV	NSV	1.1
Fluorene	86-73-7	1.1	NSV	122	30	NSV	1.1
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	NSV	109	NSV	NSV	1.1
Methylnaphthalene, 2-	91-57-6	29	NSV	3.24	NSV	NSV	3.24
Naphthalene	91-20-3	29	NSV	0.0994	NSV	NSV	29
Nitroaniline, 3-	99-09-2	NSV	NSV	3.16	NSV	NSV	3.16
Phenanthrene	85-01-8	29	NSV	45.7	NSV	NSV	29
Pyrene	129-00-0	1.1	NSV	78.5	NSV	NSV	1.1
Volatile Organic Compounds							
Acetone	67-64-1	NSV	NSV	2.5	NSV	NSV	2.5
Benzene	71-43-2	NSV	NSV	0.255	NSV	NSV	0.255
Bromomethane	74-83-9	NSV	NSV	0.235	NSV	NSV	0.235
Butanone, 2-	78-93-3	NSV	NSV	89.6	NSV	NSV	89.6

Table B-1

Ecological Screening Values for Soil
Former Plum Brook Ordnance Works, Sandusky, Ohio

Chemical	CAS No.	EPA Eco-SSLs [a] (mg/kg)	Eco Endpoints PRGs [b] (mg/kg)	EPA Region V ESL [c] (mg/kg)	Tox. Benchmark [d] (earthworm only) (mg/kg)	Tox Benchmarks [e] Terrestrial Plants (mg/kg)	Selected ESV (mg/kg)
Carbon disulfide	75-15-0	NSV	NSV	0.0941	NSV	NSV	0.0941
Dichloroethane, 1,1-	75-34-3	NSV	NSV	20.1	NSV	NSV	20.1
Dichloroethene, 1,1-	75-35-4	NSV	NSV	8.28	NSV	NSV	8.28
Dichloroethene, cis-1,2-	156-59-2	NSV	NSV	0.784 [h]	NSV	NSV	0.784
Methylene chloride	75-09-2	NSV	NSV	4.05	NSV	NSV	4.05
Toluene	108-88-3	NSV	200	5.45	NSV	200	200
Trichloroethane, 1,1,1-	79-00-5	NSV	NSV	29.8	NSV	NSV	29.8
Trichloroethene	79-01-6	NSV	NSV	12.4	NSV	NSV	12.4
Trimethylbenzene, 1,2,4-	95-63-6	NSV	NSV	NSV	NSV	NSV	NSV
Xylene, Total	1330-20-7	NSV	NSV	10	NSV	NSV	10

EPA = U.S. Environmental Protection Agency
ESV = Ecological screening value
NSV = No screening value available
mg/kg = milligrams per kilogram

Priority for Selection of ESVs:
1) EPA Eco-SSL
2) PRG for Eco Endpoints, (Efroymson, et.al, 1997a)
3) EPA Region 5 Ecological Screening Levels
4) Efroymson, 1997b
5) Efroymson, 1997c

[a] EPA, 2008, Ecological Soil Screening Level (SSL) guidance. On-line at: http://www.epa.gov/ecotox/ecossl/index.htm
[b] Efroymson, 1997a, *Preliminary Remediation Goals for Ecological Endpoints*. www.esd.ornl.gov/programs/ecorisk/documents/tm162r2.pdf .
[c] Screening value based on: EPA , 2003, *Region 5 Ecological Screening Level (ESL)*, Website version last updated August 22, 2003: http://www.epa.gov/Region5/rcraca/edql.htm
[d] Efroymson, R.A., M.E. Will, G.W. Suter, 1997b, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision, ES/ER/TM-126/R2 (microbial screening values are not included). http://www.esd.ornl.gov/programs/ecorisk/documents/tm126r21.pdf.
[e] Efroymson, R.A., M.E. Will, G.W. Suter, 1997c, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision, ES/ER/TM-85/R3. http://www.esd.ornl.gov/programs/ecorisk/documents/tm85r3.pdf
[f] Based on the screening value for total PCBs.
[g] Based on the screening value for DDT and metabolites.
[h] Based on the screening value for dichloroethylene [trans-1,2].
[i] Based on the screening value for 2,6-dinitrotoluene.

RESPONSE TO COMMENTS

Responses to Ohio Environmental Protection Agency Comments on the Draft Baseline Human Health Risk Assessment (BHHRA) for Ash Pit No. 3 and the BHHRA and Screening-Level Ecological Risk Assessment Addendum for Coal Yard No. 3 Former Plum Brook Ordnance Works, Sandusky, Ohio, Dated June 12, 2013

The BHHRA and SLERA documents were reviewed by Ohio EPA, who had no comments as indicated by correspondence received from Paul Jayko on August 6, 2013.